THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LVI. No. 1418.] LONDON, JULY 15, 1890. [42ND YEAR. Price 6d.

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Illustrated Pamphlet and Terms on application to J. E. FISHER, Stourbridge, Agent for England and Wales; to C. M. HAMILTON, Portland Place, Hamilton, Agent for Scotland and Ireland; and for all other Countries to the Patentee,

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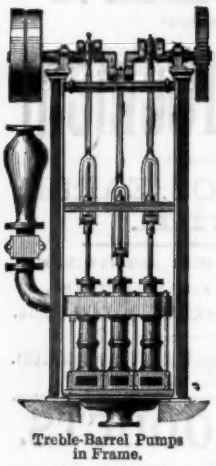
FOR PUMPING TAR, WATER, AND LIQUOR.



Treble-Barrel Pumps in Frame.

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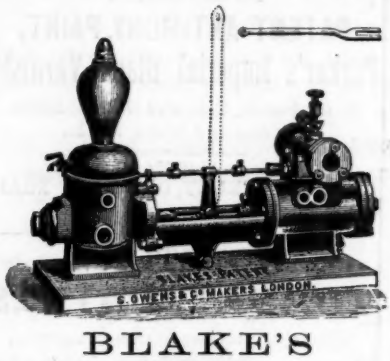

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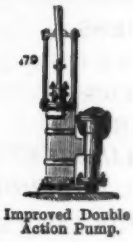

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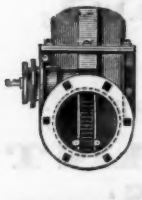
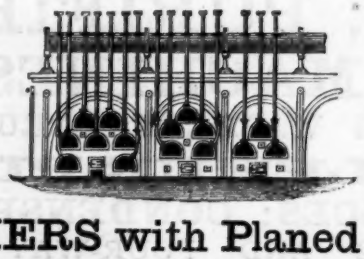
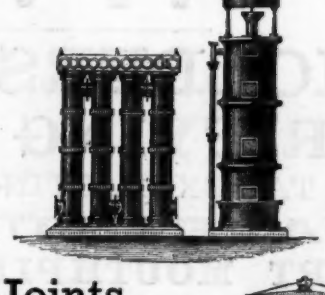
Also Bye-Pass & Stop Valves.







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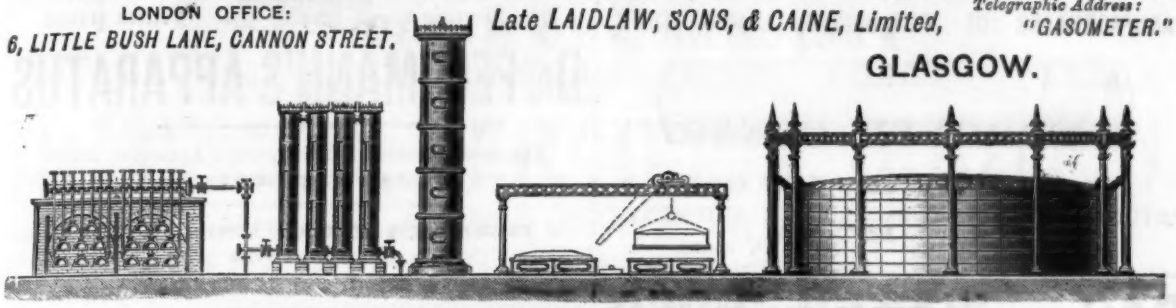

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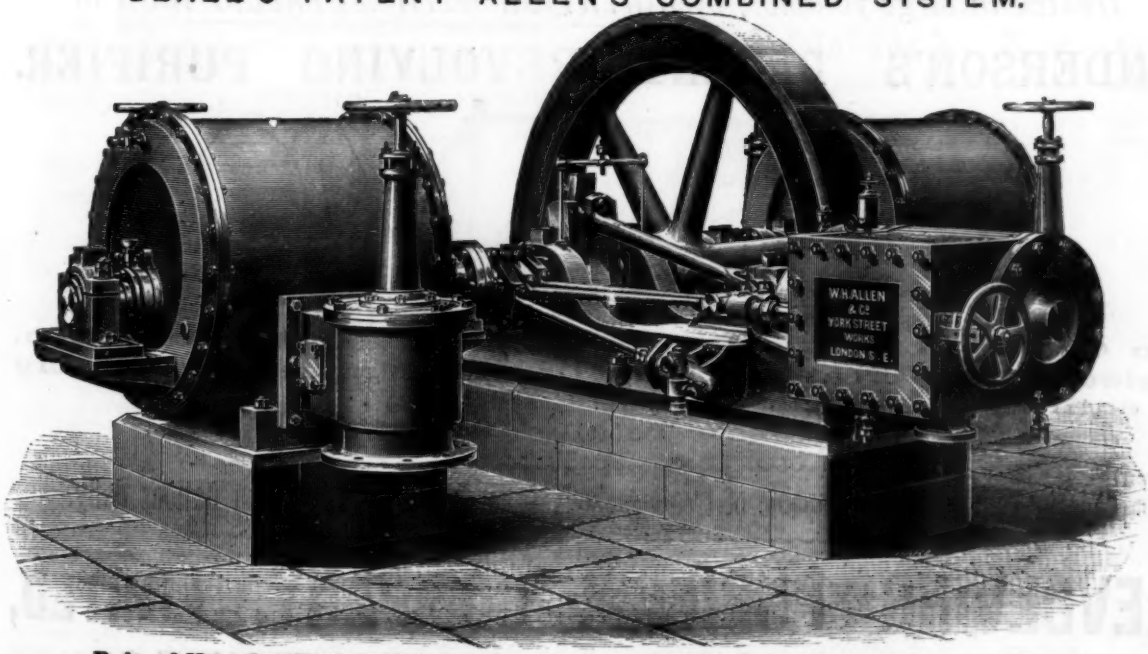

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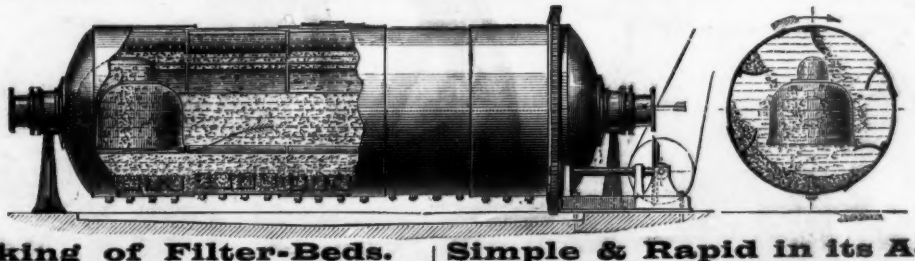

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Made in Fourteen Sizes, capable of treating singly from **4000** to **1¼** Million Gallons daily.

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REVOLUTION
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IMMENSE SAVING IN COST.
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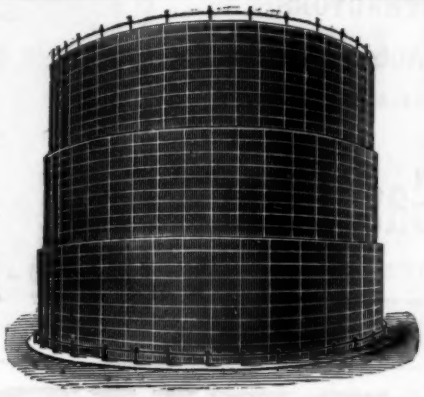
Tank Construction rendered simpler and very much cheaper; the Piers and heavy Base Stones being dispensed with.



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Engineers intending to extend their Gas Storeage should not fail to see the Two-Lift Holder erected for the Northwich Gas Company.

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NO SLIP.
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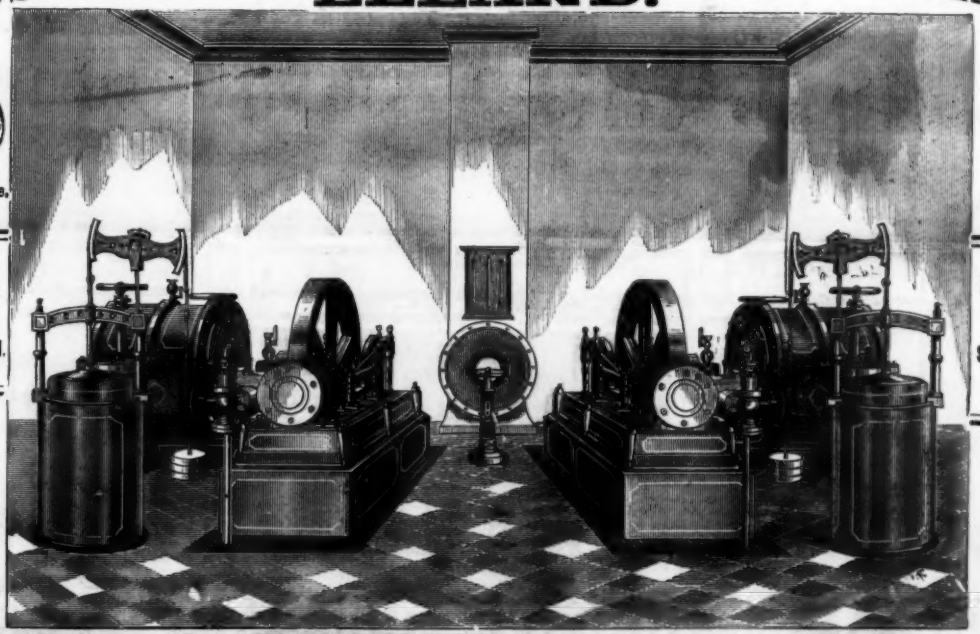

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NO HIGH SPEED.
STEADY GAUGE.

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Makers of every other description of Gas Plant, including Retorts, Retort Mountings, Condensers, Washers, Tar and Liquor Separators, Scrubbers, Purifiers, Gasholders any size, Patent Centre-Valves, Four-Way Valves, Rack, Screw, and other Valves.

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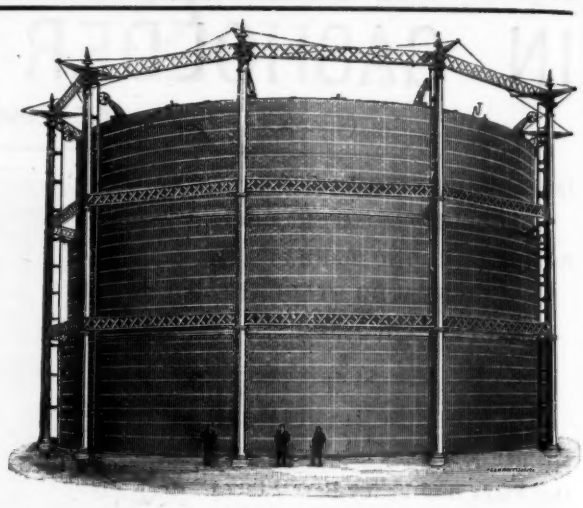

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SULPHATE OF AMMONIA PLANTS,

ON THE OPEN OR CLOSED SATURATOR SYSTEMS.

The Stills used with these Plants have been brought to a high state of perfection, and are now superior to any of the foreign appliances recently introduced.

A large quantity of liquor can be worked off in a short space of time. Very little fuel is required; and there is no loss of ammonia.

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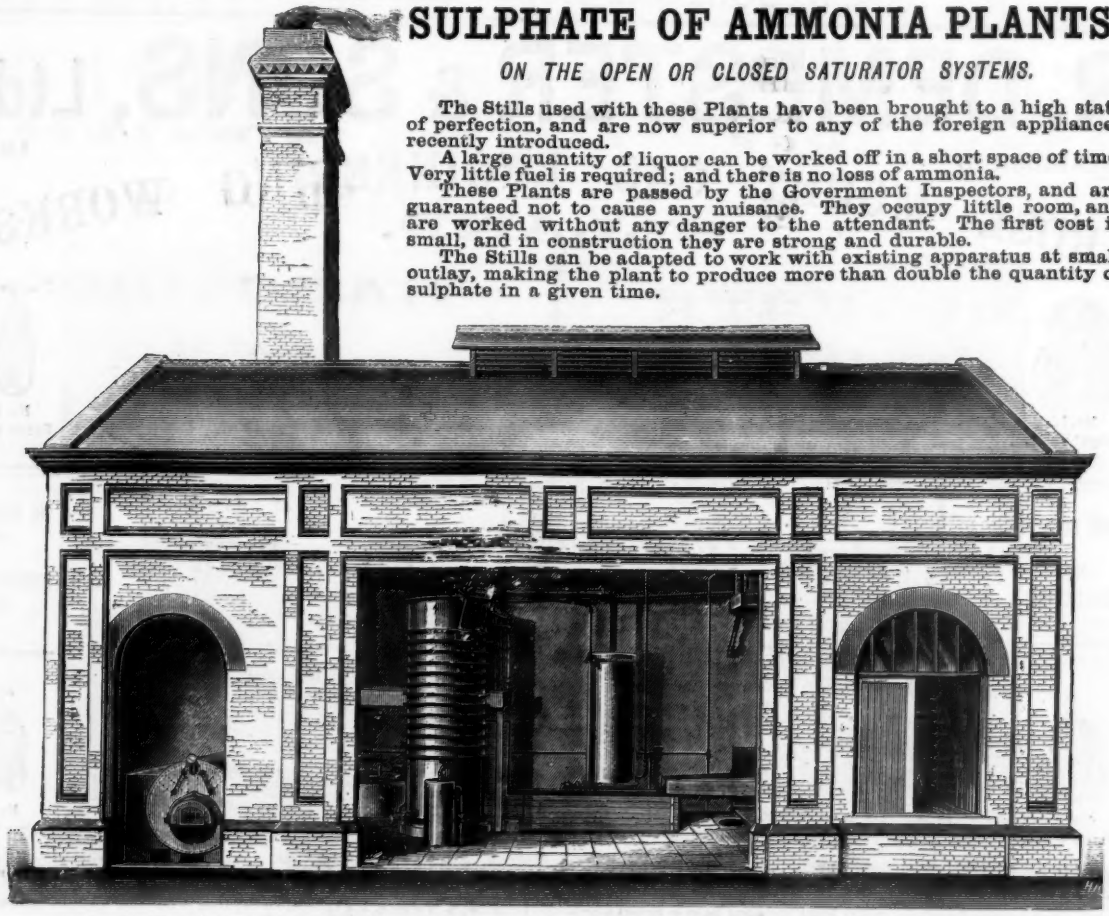

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Have been made in large quantities for the last twelve years; and during the whole of that time, have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.

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No. 2.—Improved Type,

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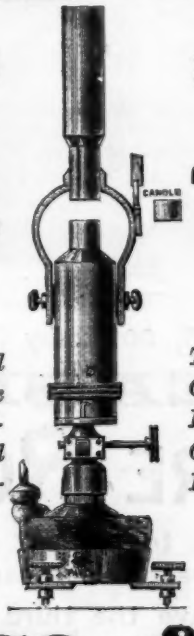

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Sole Makers of GREEN'S PATENT SCREENS FOR SCRUBBERS.

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HASLINGDEN GASHOLDER, 80 ft. by 22 ft., showing application of

PEASE'S

PATENT WIRE-ROPE GUIDING.

In adding second and third lifts to present holders, it effects a great saving in cost, and vastly increases the storeage.

The Manchester Corporation have the third lift of a 100 feet holder working by this System.

PEASE'S WIRE ROPES have been also adopted by two other Companies for completely new telescopic holders.

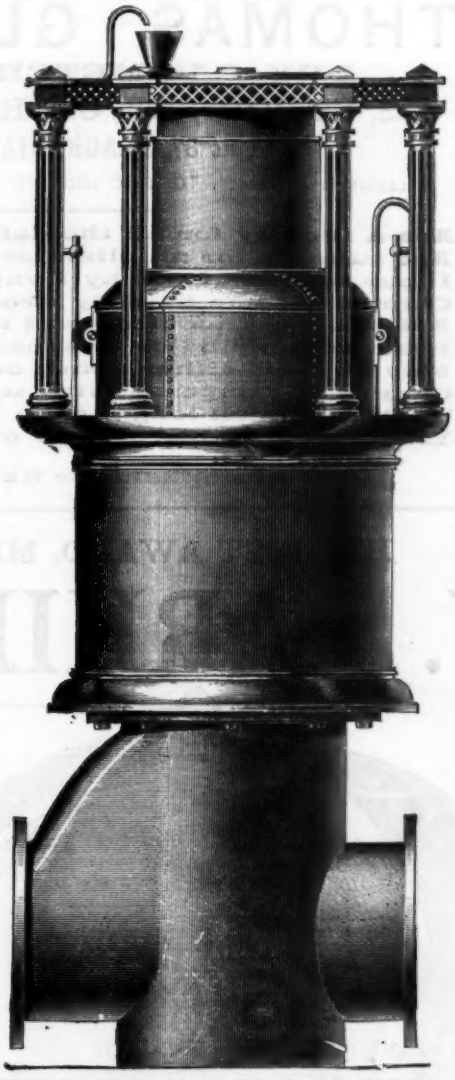
WM. COWAN'S PATENT GAS GOVERNOR.

This Governor is a perfect regulator of gas pressure. Unaffected by **even the most extreme and sudden changes of inlet pressure or of draught,** it maintains, without variation, the pressure it is adjusted to give.

This result is attained by balancing the influence of the inlet pressure on the valve-base by an equivalent force, operating *above the roof of the bell.*

Another and a great advantage is the **unique water-loading arrangement,** which is made perfect and complete by the use of **WM. COWAN'S PATENT "STATIONARY SYPHON."**

STATION GOVERNOR with TWO PILLARS.



STATION GOVERNOR with SIX PILLARS AND GIRDERS.

The water loading is further utilized to maintain automatically the depth of the "seal" in the compensating slide. While the loading is going on, the water is first delivered into the slide, from which it overflows into the loading tank below.

We have supplied these Governors to many of the most important Gas-Works in the United Kingdom and abroad, to the Engineers of which we shall have pleasure in referring those who may favour us with inquiries.

W. & B. COWAN,

ESTABLISHED 1827

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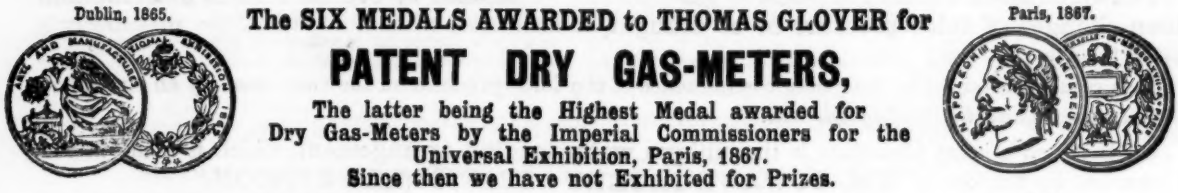
ESTABLISHED 1844.] **ORIGINAL MAKERS.** [ESTABLISHED 1844.

London, 1851. New York, 1853. Paris, 1855. London, 1862.

Dublin, 1865. Paris, 1867.



The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.
Since then we have not Exhibited for Prizes.

THOMAS GLOVER & CO.,

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214 to 222, ST. JOHN ST., CLERKENWELL GREEN, LONDON, E.C.

And at 37, BLACKFRIARS STREET, MANCHESTER.

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1st—Are a remedy for all the defects of Wet Meters.
2nd—Are suitable for all climates, whether hot or cold.
3rd—Incur no loss of Gas by Evaporation.
4th—Cannot become fixed by Frost, however severe.
5th—Are the most accurate and unvarying measurers of Gas.
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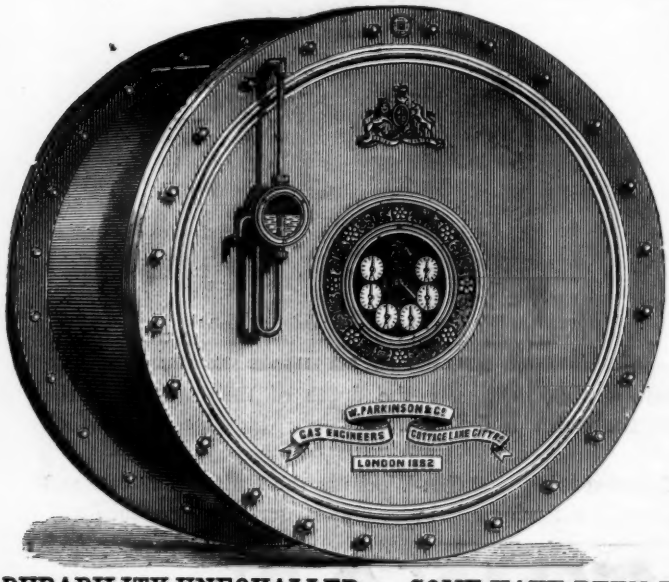

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[See also Advt., p. 180.

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NOTICE AS TO PAYMENT OF SUBSCRIPTIONS IN ADVANCE.

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THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JULY 15, 1890.

The Exhaustion of the Coal Supply.

THE computations respecting the probable duration of the British coal supply which ingenious statisticians put forward from time to time, pass over the heads of the people with so little effect, that one is tempted to think of all such exercises as of purely academic interest, but for the uncomfortable conviction that they are all founded on a sufficiently grave fact. This fact is the incontrovertible one that the coal supply of the country is really and truly its industrial capital, which is certainly being exhausted without the remotest possibility of being restored. When we think of this truth, it cannot but strike one as wonderful that we should take so little account of the consequences of our actions in returning our irrecoverable stock of fuel to the elements from which it came in the past youth of the world. There is an old illustration given in the "Spectator" to show the difference between time and eternity. The question is asked whether, supposing this earth to be wholly composed of grains of fine sand, one of which was to be annihilated every thousand years, a reasonable man would prefer a life of happiness during the whole duration of this process, to be followed by an after-eternity of misery, to one of wretchedness for the time in question, followed by eternal bliss. The problem of the coal supply is actually presented to us as though we were condemned, whether we will or not, to annihilate our capital, and practically our means of industrial existence, well knowing that every ton dissipated into its elements is lost for ever, and being totally ignorant of what can be done when it is really all gone. We have not the choice imagined by the old author, but are compelled to be spendthrifts with our eyes open. The last statistical contribution to this question is that of Mr. G. G. Chisholm, mentioned in the JOURNAL last week. This is an attempt, which does not come to very much after all, to ascertain how our national coal supply is likely to be influenced by the progress of other nations in using up their own coal capital. Mr. Price-Williams was the immediate predecessor of Mr. Chisholm in this line of statistical research; and he made out that if the demand goes on increasing at its present rate, all the coal in the United Kingdom will be exhausted in a little more than a hundred years. We have never accepted the principle of these computations of the prospective exhaustion of the national coal capital in which a geometrical rate of progression in the demand is postulated. This was the underlying fallacy of the late Stanley Jevons's calculations, which aroused the historical "scare" that led to the appointment of the Royal Commission on the subject. Framers of these estimates overlook the contingent increase of men and capital that would be necessary to deal with the enormous figures representing the output in the closing years of their series. In sober reality, there is no reason to assume even an arithmetical rate of increase in the coal output of any particular country; because it is fair to suppose that the production of other countries will continue to grow until these satisfy demands previously concentrated on the one source of supply. Reflections of this order, however, only defer the inevitable consequence. With an arithmetical rate of growth, or without any growth at all of the demand, the British coal-fields must in time be worked out. What will be done then? In default of all other response, it is to be feared that the most thoughtful of us will be driven to reply that, as he will not be there to see, it need not trouble him to answer now. Nobody can tell what an England without coal will be like. Some flippant gas managers may remark parenthetically that, as with the coal the coal-owners and agents must also disappear, posterity will not suffer loss without some compensation. The coal men might return the compliment, however; and so the argument would not advance. Meanwhile, calculators like Mr. Chisholm deserve attention; and the day may come when their warnings will have tangible results. It is some consolation to believe that coal is much more economically employed now than was the case even a short time ago. Every million tons that vanish do more work than the last. Let us hope that when the future historian comes to appraise us for what we did with the store of fuel which it is the peculiar privilege of the present age to use, he will think that, on the whole, it was employed to the general advantage of the race.

The Epidemic of Strikes.

THE air of the Metropolis during the past few weeks has been full of reports of strikes of policemen and postmen, varied with a little excitement about a small display of insubordination by a battalion of Guards. There has been this benefit from such a collection of "strike" matter in the newspapers of one week, that the manufacturers of public opinion for these organs have been compelled to

deal prudently with the issues involved. The trifling military trouble need not be commented upon here—the conditions of regimental service being altogether outside the purview of a technical publication. The cases of the policemen and postmen, however, sufficiently resemble that of gas stokers to warrant our noticing them. The outbreaks of the past week were the culmination of a vast amount of agitation, which has been kept up for many months past by the same class of demagogues who "engineered" the dockers' strike, and have been sadly in want of a second edition of their much overrated success in that particular enterprise. Policemen and postmen resemble gas stokers in being trained, as distinguished from skilled, workers for wages. They have also approximated themselves to the stokers by swallowing the declarations of the agitators which told them that they were indispensable, and could accordingly do as they pleased in the way of asking and having. Finally, like the stokers again, they have discovered their mistake. Their strikes have gone off in a fizzle; and the community is going on just as usual, notwithstanding the fact that a few score of the men who used to patrol the streets or carry letters have been turned out to seek their livelihood by some other means. This last circumstance must be a terrible awakener for enthusiastic trades' unionists, who may have persuaded themselves in excited meetings of "delegates" that their organization was omnipotent. What these deluded men have to learn is that no man or group of men in this world can act as though he or they were indispensable. The leaders of the new-fangled Unions of unskilled labourers altogether miss the lesson of strikes of skilled workmen. The latter, for example, decide to "put the screw on" their employer when they think the latter can better afford to pay them what they require than go to the trouble and expense of obtaining fresh hands, or of losing trade by shutting up his works. When a strike is successful, it is through a clever reading of the signs of the times by those who advise it. The ignorant wire-pullers of the unskilled labourers who have lately been indulging in strikes, proceed in a different manner. They assert the indispensable quality of their dupes, and rest upon violence to prevent this pretence from being exploded by the rush of perfectly capable candidates for their rejected berths. Where the violence is permitted to triumph, they score a temporary and local victory. Where it is quelled, they fail. Is this a condition of things on which the true friends of the working man can afford to be jubilant? Is victorious violence the path to the Promised Land of the Opportunist Socialist? It appears so; but what is to be the end of it all? The respectable press has taken alarm at the undisguised reliance of the new leaders of the hosts of labour upon violence for gaining their ends. The doctrine that Force is no Remedy has been preached by writers who, so long as that much-abused individual the capitalist, in the shape of a Dock Director, was its victim, were disposed to shrug their shoulders, and opine that the sufferer was righteously punished for his misdeeds. Violence, which went so far to win the cause of the dockers, does not look so charming when it invades the ranks of the constabulary and the letter-carriers, to say nothing of the military. Even an Anarchist newspaper man will turn when a strike, rendered temporarily effective by violence, prevents him from collecting the usual "copy" for his regular issue; and the most Socialistic of writers, if he has a home of his own, feels greatly disturbed in mind at the prospect of rampant burglary and no police protection in his neighbourhood. Sooner or later, this Midsummer madness of revolt will pass from the ranks of trained workers; but unless reasonable views speedily prevail respecting the best way of procuring the removal of grievances, this temporary aberration will be found to have left a permanent evil effect upon the characters of the individuals and the classes influenced by it.

The Dual Control at Bristol.

A CURIOUS case has cropped up at Bristol, which, if it illustrates a peculiar point of the law of master and servant, also shows up the quality of the Bristol gas administration. One is obliged to use the term "master "and servant" in connection with the matter; but it must be understood that in Bristol, at least, the phrase has only a legal meaning—the ordinary interpretation of the words having ceased to apply to the Directors of the Gas Company and the "gentlemen" who condescend to allow their names to be borne on the Company's pay-sheets. It appears that a fireman named James Granger was injured while in the performance of his duties, and went into the Infirmary; remaining under medical treatment for nearly five weeks. He communicated weekly with the Company to inform them that he was still unable to return to work; but he made no claim for wages during this time. After he had been away for a month, the Company sent him a printed notice to terminate his engagement on the following Saturday. Upon this Granger took out a summons against the Company for the amount of his wages, calculated at the full rate for the whole time of his absence; it being argued on his behalf, at the hearing, that the delivery of the notice already mentioned was an acknowledgment by the Company of the continuance of the engagement until so terminated. The case was heard, under the Employers' Liability Act, in the Police Court, and Granger's claim was dismissed by the Magistrates. A case for the Queen's Bench Division was granted and set down in the list; but the Company have paid the amount claimed, with the appellant's costs, to the huge delight of the "labour party," who fought the case in Granger's name, and, of course, want to make the most of their victory. It must be apparent by this time to the Union leaders, however, that it is poor sport to knock down the Bristol Gas Company. The moral effect of any further surrenders by the Company must be *nil*, for their prestige for business capacity is already at zero. It is therefore not worth while to argue upon the consequences of Granger's action as if it had any general bearing. Our readers may form their own opinions with regard to the merits of the case as between him and his employers, and as to the prospects of either appellant or respondents, if the appeal had gone forward. There are awkward points in the matter for both parties; but having been settled out of court, nobody can ever know what the Judges would have thought of them. While mentioning the affairs of the Bristol Gas Company, it should be noticed that the new Chairman, Mr. J. W. S. Dix, has been instrumental in establishing a *modus vivendi* between the two sources of authority in the undertaking—the Board and the Executive of the Gas Workers' Union. An official communication to a local newspaper gives the strange intelligence that "an occa- "sional hitch" having occurred since the strike, the Directors, apparently despairing of ever again being in a position to regulate the conditions of work at the stations, "had "expressed a wish that the men should meet and "endeavour to frame a plan of their own, which they "did." A deputation from the Company's three stations met the Chairman and the Engineer (Mr. William Fiddes), who accepted the men's programme in the name of the Company. It is not surprising that, under these conditions, there is a "satisfactory understanding with the men, "who themselves are well pleased with the result which "has been achieved." The satisfaction of the shareholders, it may be presumed, is expected to come later. In order to confirm the arrangement between the men and the representatives of the Company, the latter attended meetings held at a house-of-call patronized by the men, and, under the chairmanship of the President of the local branch of the Union, addressed the assembly of those who, by the pleasing legal fiction, are designated the Company's servants. The newspaper which records this lying down of the Union lion with the Company lamb thinks it all very lovely. Let us hope it will prove so in the end.

The True Nature of Corporation Gas Profits Exposed.

NOTTINGHAM echoes the cry that has been heard through the central and northern counties, to the effect that if municipal treasuries are to be subsidized as of yore out of gas profits, gas prices must be raised to find the wherewithal. It is to be expected that this eventuality will arouse discussion of the peculiarities of the so-called gas profits out of which these subsidies are paid. It has apparently dawned upon local politicians in a few places that there is not much difficulty, and correspondingly little credit, in making profits when the seller can fix his own price for his commodity. When the Chairman of a Corporation Gas Committee affably offers to return any amount of profit desired, provided he is allowed to put up the selling price of gas, the most bigoted advocate of the "ratepayers "interest" begins to suspect that here is a case of "robbing Peter to pay Paul." There are boroughs in

which the Chairman of the Gas Committee could say to the Council: "Do you want £20,000 from the gas profits "next year? Why, certainly. We'll put up the price "4d. per 1000 cubic feet, and the thing's done. Would "you prefer £30,000? Then we'll clap on 6d." Stated thus crudely, the case seems to assume a different aspect from that which it had when, so long as the price of the gas was what could, in local estimation, be held to be "reasonable," profits appeared to come naturally from the gas undertaking. With dearer coal and labour, a readjustment is necessary; and when all the extra expense of working in dearer times is placed on the backs of the gas-consuming minority, in order that "profits" may be made as usual for the benefit of the non-gas-consuming majority, the former will naturally inquire whether the term is rightly used in this case. It is, however, unnecessary to discuss this point anew in these columns, where it has been examined and pronounced upon time and again. Every locality must please itself in this matter. Gas consumers, although in the minority, are still sufficiently numerous to settle the question in their own way everywhere if they choose; but while they prefer to allow themselves to be rated twice over—once directly, and the second time indirectly—to flatter the conceit of a Corporation Committee fond of displaying "profits," nobody can help them.

A Step Backward at Bury.

A STRANGE controversy has been revived at Bury. For years past the Gas Committee and the Finance Committee of the Corporation have disagreed as to the disposal of the profits of the Gas Department. The Local Act says that "one moiety thereof" shall be applied "for the purposes "of the Improvement Act." This is clear enough; and the practice has been to apply in relief of the rates half of the profit made in any one year. But the section goes on to say, as to the other moiety, that it shall be applied "in "reduction of the price of gas for the then next ensuing year, "as nearly as may be corresponding to the amount of such "moiety." Obviously, the intention of Parliament was to place bounds to the profit-making of the Corporation, and ensure something like fair treatment of the consumers. To do them justice, the Corporation do not seem to have been anxious to evade their responsibilities. They appear to have been desirous of carrying out the bargain; but they have differed, and continue to differ, as to what that bargain is. How were they to give the consumer his half share of the profits? The simplest course would apparently have been to take a penny or twopence off the price of gas; but the Gas Committee never saw the matter quite in this light. They preferred to give the consumer his moiety of the profits in the form of a discount off his gas bill. Down to 1887, the price of gas was 2s. 11d. per 1000 feet, with a discount of 4d. It was then discovered by the Finance Committee that the result of this system was that income-tax was being charged and paid upon profits which were not actually being made. They succeeded in convincing the Somerset House people of the truth of this contention, though they were at first unable to gain the assent of the Gas Committee to it, or to convince the gentleman who filled the office of Borough Accountant that there could possibly be anything wrong in a system of bookkeeping which had grown up with the borough. The result of a controversy extending over the greater part of that year was that the income-tax alleged to have been overpaid was refunded, and the Gas Committee practically resolved to sell gas at cost price. There was a reduction to 2s. 1d. per 1000 cubic feet; and this price has been maintained for two years. The "consumers' moiety of the profits' "account" ceased to appear in the balance-sheet; and apparently everybody was contented. Now, however, the old question is raised with all its former vigour. The Borough Treasurer has discovered that the consumers are being unfairly treated. They ought, he holds, to have had £3930 divided among them in 1886; while in the three following years other profits, to the amount of £2500, were also withheld from them. There is thus a total of £6430 which should be, as the Act directs, devoted to the reduction of the price of gas. But the result of the past year's working was a slight loss; and, owing to the advance of wages and materials, an increase in the price charged is absolutely necessary in the present year. The estimate of Mr. W. H. S. Gendall, the new Engineer and Manager, is that every thousand cubic feet of gas sold will cost the Corporation, inclusive of interest and sinking fund, 2s. 3¼d., against a present selling price of 2s. 1d. With the surplus already referred to, the Committee could well afford to sell gas at the old rate; and no very great injustice would be done. They have, however, decided to make a fictitious advance in the price to a nominal 2s. 4d., and allow the consumers a discount of 4d., in addition to the usual 1d. for prompt payment. The actual price will thus be lower than last year, though the cost of production will really be 2½d. per 1000 cubic feet more than it was then. A section of the Corporation appear to find wonderful consolation in this creation of an artificial price, and in a juggling with figures which produces only confusion. If it was desirable to divide the profit—and certainly if it exists the consumers are entitled to it—it could have been much better done by taking 1d. or 2d. per 1000 cubic feet off the existing price, than by pretending to add 3d. and then allowing a discount of 5d. The position is not mended if it be true, as a section of the Council maintain, that there is actually no divisible profit. This is, however, an abstruse question into which we are hardly disposed to enter. It must be fought out by those who understand the mysteries of the system of bookkeeping in use at Bury. Certainly, neither consumers nor ratepayers will gain much if the consequence of reverting to the old system is that income-tax has to be paid, as it was alleged to have been before, upon profits which were not really made.

Messrs. John Wright and Co., Limited.—Letters of allotment and regret in this Company were posted last Friday. As intimated in the JOURNAL last week, the applications for shares were largely in excess of the number to be allotted.

Projected Great Alkali Union.—According to the *Pall Mall Gazette*, negotiations are proceeding for the combination of all the alkali works of the kingdom, which, if effected, will surpass anything of the kind hitherto attempted in this country. The Salt Union was floated with a capital of £4,000,000; but in the case of the alkali works, £8,000,000 to £9,000,000 is the figure mentioned. There are upwards of 100 works in England; the largest groups being in East Lancashire and Yorkshire, Widnes, and the North of England. The products are caustic soda, bleaching powder, and chlorate potash. The industry is at present in a transition stage—the old or Leblanc process being gradually superseded by the ammonia-soda process; and a number of works have been closed in consequence. This circumstance has, of course, a direct bearing upon the value of the properties. It is said that the owners will be expected to accept one-third of the purchase-money in shares. The immediate effect of the negotiations on the trade has been to send up the price of the products, and to create great uneasiness as to the future. The alkali manufacturers have had the success of the Salt Union impressed upon them by the higher prices which that combination has secured for their salt—this being the raw material of the soda makers; and so they are in a mood to listen to the proposals which have been made to them by the financiers.

Proposed Search for Coal in the South-East of England.—Last Wednesday, a lecture was delivered at the Mansion House, by Professor T. M'Kenny Hughes, on the subject of the possibility of finding coal in the south-east of England. The Lord Mayor (Sir H. A. Isaacs) presided; and, in opening the proceedings, explained that a Committee composed of scientific and business men had been formed for the purpose of investigating the distribution of the coal measures in the south-east of England by means of borings, sinkings, or other devices which might become available. The co-operation of the London Chamber of Commerce had been promised; and the Committee felt that there should be enough public spirit among coal consumers of all classes to raise sufficient funds to make an exhaustive examination of the deep-seated geology of the area in question. Professor Hughes then proceeded to lay before the meeting the evidence on which geologists relied when they stated that there was a strong probability of the basins of coal extending right across the south of England. He contended that geologists had a claim to be listened to and supported in this matter. Whatever difficulties they might encounter in carrying out their object, ought to be overcome with the common sense and support of the business men of London. Lieut.-Col. H. H. Godwin-Austen stated that his father brought forward in 1855 the subject then under discussion, in a paper read before the Geological Society. The recent finding of coal at Dover was really accidental; and if matters went on as at present, future discoveries within the next hundred years would be similarly the result of accident. It was for this reason that the Committee had endeavoured to initiate some action in the matter. A resolution, expressing the opinion of the meeting that the objects proposed to be prosecuted by the Committee were deserving of the cordial support, financal and otherwise, of the citizens of London was unanimously passed. A vote of thanks was likewise accorded to the Lord Mayor for the assistance he had afforded to the movement.

WATER AND SANITARY AFFAIRS.

Mr. Beal's pertinacity has prevailed; and he has at length succeeded in getting the President of the Local Government Board to receive a deputation from the Vestry delegates on the subject of the Metropolitan Water Supply. It will be remembered that this deputation emanates from the meeting recently called together by the Vestry of St. James, Westminster, of which Vestry Mr. Beal is an active and influential member. As we expected, when Mr. Beal appeared before Mr. Ritchie, he had very little to say about the assessment question; the burden of his speech being a proposal for the appointment of a Board of Arbitration to determine the price to be paid to the Water Companies for the surrender of their undertakings. Mr. O. V. Morgan, who introduced the deputation, in like manner urged the question of transfer, which he supported by the calculation that, if this were accomplished, there would be a saving of at least £300,000 per annum for management and interest. We may observe that management in 1888 cost a little more than £134,000; and interest, something like £177,000. If by some magic these two items are to be entirely eliminated, Mr. Morgan's anticipation may be verified; but certainly not otherwise. A staff of clerks must be maintained; the cost of collection must also be met; and loans and debentures cannot be repudiated. These points relate to the transfer; and it was left to Mr. Baumann to speak of the assessment, in connection with which he asked Mr. Ritchie to give Mr. Causton's Bill a chance of being carried into law this session, so as to prevent the quinquennial valuation from raising the water-rates. Being possessed of the views entertained by the deputation, Mr. Ritchie delivered a very important reply, giving the gentlemen present to understand that while they thought, in respect to Mr. Causton's Bill, they were asking for something that could very easily be granted, they were in reality requesting a very hard thing. Rights had been conferred upon the Companies in 1885 which were now just going to be exercised; and Parliament was at this juncture to be asked to take away these rights. Mr. Ritchie signified that this was a proposal with which the Government could have nothing to do; and emphasized his remarks in the face of some interruptions. Sir W. Farrer's warning, given at the meeting of delegates, was thus verified; and the deputation received the "additional slap in the face." On the subject of the transfer, Mr. Ritchie was to a certain extent in agreement with those who approached him. The Conservative Government in 1880 had shown its desire to have the water supply of the Metropolis placed in the hands of some representative body; and Mr. Ritchie intimated that his own wishes at the present time went strongly in that direction—a feeling which he "felt sure" was shared by his colleagues. As for the body that should be entrusted with the water supply, he fully agreed that it should be the London County Council. In the meantime, the Government were quite prepared to give full consideration to any "suggestions, recommendations, and reports" which the authorities might lay before them. From the declaration thus made by a member of the Cabinet, it would appear that a crisis in the history of the Metropolitan Water Supply is at hand. The question of purchase is to the front; while that of the assessments is brushed aside. On all hands, it is admitted that a fair price should be given to the Water Companies; and there is an anxious repudiation of anything like a policy of confiscation. What these professions are worth will be seen when negotiations actually commence.

The House of Commons has passed the General Powers Bill of the London County Council, with its clause authorizing the expenditure of £5000 for the purpose of conducting an inquiry into the water supply. There is nothing to prevent the Bill from passing the House of Lords and becoming law, at least so far as this clause is concerned, unless a doubt as to the merits of the County Council should influence the peers to interpose an objection. But a curious check on the ambition of the Council has occurred in the House of Commons; permission to be represented on the Thames Conservancy being refused, while an enlarged representation on the Lea Conservancy was permitted. The reason for this distinction is not very clear; and the decision of the House with regard to the Thames seems rather to arise from a latent dislike to the County Council, founded on a suspicion that this body is aiming at more power than properly belongs to it. How far this may influence the future of the water question, is a doubtful point; but it may be expected to have some effect. In respect to the inquiry on which the County Council propose to expend £5000, it is to be hoped it will have the benefit of some better general evidence than has been conspicuous at the Corporation inquiry now in progress. Mr. Jabez Hogg, has been recalled, and has excelled his previous performance in the extraordinary nature of the statements he has laid before Sir Guyer Hunter. Mr. Hogg has discovered that the River Roding, which he describes as being in some places so thick with sewage that the sediment will almost serve the same purpose as ink, flows into the River Lea, and contaminates the water supply of the New River Company. Looking on the Ordnance map, we are utterly at a loss to make out any connection between the Roding and the Lea. The former, as most Londoners know, enters the Thames at Barking Creek, while the latter goes into the Thames just below Blackwall. Tracing the two tributary rivers each to its source, we find them starting from very remote points, and traversing two distinct drainage areas. Mr. Hogg also asserts that the highly contaminated water of the Roding is taken direct into the reservoirs of "the Water Companies;" by which we may suppose there is an allusion to the East London as well as the New River Company. But, in some way or other, Mr. Hogg is intent on showing that "the City of London "is in a very bad position as to its water supply." If one-half the particulars given by this gentleman are correct, the case is bad indeed. He is reported to say that "he "found very serious contamination in the water of the "New River; no end of sewage matter being allowed to "pass into the water, which thus became dangerous to "health." The statement, so far as concerns the actual supply, is directly at variance with the official reports of Dr. Frankland, wherein the water distributed by the New River and East London Companies in the month of May is described as possessing "a high degree of organic "purity"—a similar report being made for April. The statements put forth by Mr. Hogg concerning the water taken from the Thames are equally preposterous with those having reference to the Lea; while his ideas as to supplying all London with water from the Chiltern Hills and other chalk ranges are in opposition to the views of the best geologists.

The Prohibition of Saccharine.—In the Journal last week we briefly noticed the passing of a law prohibiting the introduction or production of saccharine in Italy. It may be of interest to indicate the extent to which this substance is prohibited. According to Kuhlow, in the *Chemical Trade Journal*, the importation of saccharine into France and Algeria was prohibited by a decree of the President of the Republic dated Dec. 1, 1888. In a decree dated April 3, 1889, the Spanish Government not only prohibited the importation of saccharine into Spain, but also made its employment in food stuffs as a substitute for sugar a penal offence. In Belgium, the law of May 21, 1889, imposed an entrance duty of 140 frs. per kilogramme on saccharine and on all articles containing down to 0·5 per cent. of the substance. In Holland, saccharine has for a long time had to pay an *ad valorem* duty of 5 per cent. as a drug; but it is probable that the long-entertained intention to impose a duty of 60 florins per kilogramme will be carried into effect.

An Improved "Inlet" Gas Regulator.—It is not unfrequently a subject of complaint in regard to gas-regulators as ordinarily constructed, that although they may be carefully set by the principal of an establishment to pass a given quantity of gas, there is nothing to prevent them being interfered with in his absence by subordinates; and when this is done the entire object of the appliance is frustrated. This defect has been overcome by Messrs. Slatter and Watkins, of Little Marlborough Street, W., who have invented and patented an "inlet" safety regulator which is stated to be absolutely free from the above-mentioned objection. As the appliance is fully described in the abstract of the specification given in our "Register of Patents" to-day, it is unnecessary to refer here to its general structure; but it may be pointed out that, while the handle by which it is manipulated is within reach of anyone, the internal arrangement, which performs the really important function of regulating the flow of gas, is only accessible by means of a special key. The gas is regulated before it enters the meter, the position of which is quite immaterial; and as the regulator may be fixed in any part of the premises, the owner can have full control of the supply from his counting-house, office, or sitting-room. A representative of the Journal recently inspected the appliance in operation, and found that it justified the claims made for it by its inventors.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 165.)

All last week, nearly up to the close, things were terribly flat on the Stock Exchange. The causes may be briefly summed up as proceeding from the fear of tightness in the Money Market, and of a financial collapse in South America. But the general tone improved considerably on Friday, owing to a brighter view being taken of the River Plate crisis, and to the Bank-rate having undergone no rise. The Gas Market not only shared in the general depression, but continued flat to the close of the week; Saturday's prices being the lowest. Gaslight "A" gradually fell away from 251½, on Tuesday, to 244, at which price one special transaction was marked on Saturday. The quotation has dropped 4½. The "H," however, which had been put up on Monday, was allowed to stand, though it did not close at its strongest. One deal in "B" was effected at a fraction above par; and full value too. South Metropolitans were firm. "B" changed hands once or twice at high figures; and "A" was largely dealt in on Thursday at good average prices. Commercials also have been moderately active and firm. A transaction or two in British alone saved Suburbans and Provincials from complete stagnation. Among the Foreign undertakings, financial troubles in South America have naturally affected those located there, and have made them recede in price, but not to any large extent. The prices of Bombay old and new have been brought nearer to a proper proportion, by advancing the latter and reducing the former; but even now the new shares are much the cheaper. Imperial Continental has receded; and the final quotation shows a drop of 2½. Continental Union has been moderately dealt in at firm prices; but European has been quite quiet. Owing to a slight misconception, it was stated last week that the prospective dividend of this Company would be at the rate of 16 per cent. When the allotment of fully-paid capital is effected, the dividend will about equal that rate upon the present capital. But until that operation is actually carried out, we think it better to revert in our Stock List to the last declared rate. Water has been a very quiet and fairly steady market; though East London is a little easier. At the Mart on Wednesday some New River Shares realized much above the market quotation.

The daily operations were: Moderate business in Gas on Monday, well distributed throughout the list. Nothing was done in Gaslight "A;" but "H" rose 1. South Metropolitan and Commercial were firm. Gas was rather quieter and weaker on Tuesday. Gaslight "A" and Imperial Continental fell 1 each; but Bombay new rose ¼. Business in Gas continued much restricted on Wednesday; and Gaslight "A" receded 1 more. Thursday brought a renewal of activity in the Gas Market; the two large issues, Gaslight "A" and Imperial Continental, having most of it. They again declined in value; losing 1 each. South Metropolitan "A" was firm and active. Bombay old receded ¼. Friday was a quieter day in Gas; but there was no sign of regaining strength. Gaslight "A" fell 1½; and Imperial Continental sellers were 1 easier. Saturday's business was more extensive than usual; but no prices were better, and most were rather worse. San Paulo fell ¼. East London Water receded 1½.

ELECTRIC LIGHTING MEMORANDA.

The Cost of Working Alternating Transformer and Direct Supply Stations—The Cost of Electrical Traction—New Localized Electrical Supply Companies.

It is a very curious coincidence that, whereas last week we complained in this column of the difficulty of obtaining information relative to the actual working expenses of electric lighting companies, the next issue of the *Electrical Review* contained a paragraph dealing with this very point. It was editorially stated in that journal, although without mentioning names, that an average of 17 to 18 lbs. of good coal is used in alternating current stations per net unit of current sold; whereas the consumption of coal for supplying the direct continuous current on the three-wire system is just about half, or from 8 to 9 lbs. per unit. Furthermore, our contemporary is assured that the total cost of engine-room expenses (which includes fuel, water, petty stores, and wages) averaged last year, in the case of one continuous-current West-end company, a trifle less than 2d. per unit. For another station, working alternating machines and transformers, the cost per unit for the best three months of the year was 7d. and upwards; while in the case of a provincial station it was over 9d. This information is professedly given on good authority; but it is so serious in its bearings upon the future of the alternate-current system, that our contemporary hesitates to accept it. At any rate, there is evidently something in it, or electricians would not be so shy as they are of holding out hopes of any substantial reduction in the cost of current supplied from central stations.

The idea that, after all that has been said and done, it is on the price of the current that the prospects of electrical supply companies depend, underlies a weighty article in a recent issue of *Engineering* on electric tramcar propulsion. We are, however, not greatly concerned with this particular application of electricity, except for the connection it has with the general question of the cost of generating and distributing powerful currents. The article makes it plain that, although a couple of horses manage to work an average tramcar, when the same vehicle is driven by electricity it is not safe to reckon upon less than 6-horse power being required. Then comes the question of the cost of this power; and on this head the writer says that "it is quite certain that before electric tramways can oust horseflesh in this country, they will have to find a much cheaper method of working than the electric light companies have done. These propose to charge 8d. per unit—that is, 1·3 horse-power hours, or about 6d. per horse-power hour." It is acknowledged that the lighting companies are hampered with the necessity for meeting great variations of load for a short time, and with the expense of large mains for a small output; yet "it is a long step from 6d. to less than ¾d. per horse-power." It is indeed; and it remains to be seen if the electricians can solve the problem. An illustration of the expense of electrical traction was noticeable during the recent meeting of The Gas Institute at Ryde, in connection with the electric tramway on the pier; a gas-engine of 8-horse power nominal being kept working to supply current for a couple of cars which, on such a level track, a pair of mules would run away with. Meanwhile it may be remarked that *Engineering* is too favourable to electricity in taking its price at 8d. per unit, seeing that at Chelmsford the price charged by the local firm of Crompton and Co., who have exceptional advantages for affording a cheap supply, is 1s. per unit.

During the last few days, there has been quite a rush for registration by new electrical companies. A peculiar feature of many of these (to which local names have been assigned) is that they are projected by the Brush Company, of Belvedere Road, Lambeth, and have almost nominal amounts of capital. The idea of electric supply companies for Canterbury, Cardiff, Ipswich, Manchester, and many other cities and towns, with capitals not exceeding £100 in any case, is almost grotesque. Another company has registered several ventures of the kind with uniform capitals of £1000. It is quite possible that some of our provincial readers may be exercised in mind with regard to a proposal to light their town with electricity for an apparent outlay of £100; but it appears that the movement is a purely formal one. The Board of Trade are said to be responsible for this new departure in the history of electric light speculation, through the practical denial of powers of assignment to Licences under the Electric Lighting Act. Consequently, the legal advisers of these parent Companies have held the opinion that if they intend at any time to do business in the provinces, they must prepare the way now by taking "a local habitation and a name." The counsel appears somewhat fantastic; but the gentlemen who gave, and those who have acted upon it, must be presumed to know what they are about. At any rate, it does not appear that the registration of these various companies means anything in particular. There is nothing to prevent the Brush or any other company of the kind from registering so-called local companies for every city, town, and village in the kingdom if they like to bear the cost. How much better their legal position and financial prospects would be for this action remains to be seen. The proceeding in question is styled a defensive one; but it might be imagined that such sweeping measures would tend to defeat their own object. If there is any meaning in the move, it cannot escape the attention of the Board of Trade, and, one would think, could be easily checkmated. However, it is a matter on which we have no opinion to express.

Electrical Standards.—It is expected that the Electrical Standards Committee will arrange for a discussion, at the forthcoming meeting of the British Association, on the best values to adopt for the units of electrical measurement.

Society of Chemical Industry.—The annual meeting of this Society was held at Nottingham last week, under the presidency of Sir Lowthian Bell, D.C.L., F.R.S., the proceedings opening on Wednesday. The General Secretary first read the annual report of the Council, which stated that the membership of the Society had increased from 2445 to 2595. During the past session, 73 papers and 14 communications had appeared in the Society's *Journal*, as against 53 papers and 5 communications the year before. The Council announced that, in constituting the permanent governing body of the Imperial Institute, the interests of the chemical industries had not been passed over, as the appointment of one member had been allotted to the Council of the Society. After the adoption of the report had been moved and seconded, Mr. E. Rider Cook gave a short statement of the financial position of the Society. He pointed out that, although the Council had devoted a large sum of money to the publication of the *Journal*, yet the increase in the number of members would be sufficient to ensure a working balance at the end of the financial year. The President then read his address, which was on "The Smelting of Iron Ores Chemically Considered." In the afternoon several members paid a visit to the Midland Railway Works at Derby, while smaller parties visited other works of interest in the district. In the evening the Mayor of Nottingham held a reception and *conversazione* at Nottingham Castle. Visits to other local works were paid on Thursday; and on Friday there was an excursion to Welbeck Abbey.

A LESSON FROM LEEDS.

For some unexplained reason, the water-gas people have been so very quiet of late that one might be pardoned for forgetting their existence. Mr. Samson Fox has had other business to attend to besides working up his own particular branch of this business. Mr. B. Loomis is understood to have a fuel-gas plant in successful action at Messrs. Firth's establishment in Sheffield; but of neither the Van Steenbergh nor the Stapp speculation is anything heard just now. Meanwhile the season is waning fast. In a very few weeks the holidays will be upon us, when nothing can be done. If the water-gas people lose this season, it will be impossible for them to make a fresh start before November, when the year is as good as gone. Their slackness will be generally interpreted to mean that they are conscious of inability to meet the conditions of the English market—possibly for a reason that may be gathered from the letter of our correspondent last week, inquiring about supplies of cheap petroleum. At any rate, if the water-gas people mean business, now is their time, unless they are willing to wait for another year.

The example of Leeds comes very opportunely, in a sense, to quicken the perceptions of gas managers who may have thought that labour troubles were quelled for the time, and that consequently there is no need for hurry in putting the retort-house in order by adopting the most approved modern appliances for lightening handiwork and facilitating production. Long ago, when expounding the lessons of the South Metropolitan and Manchester strikes, we drew attention to this aspect of the labour question; and there is no need to repeat the comments and reflections on the matter which will be found scattered through the numbers of the Journal for last January. We refer to these articles now simply because they are, by the recent case of Leeds, rendered as apposite to present circumstances as they were to the conditions of the time of their publication. If those articles had not appeared then, they, or something identical with them, would have been required now. We know by experience how difficult it is to move directors of gas companies and members of gas committees of corporations to take fresh departures, and sanction experiments with new descriptions of plant and machinery, on anything like a competent scale. Therefore we say: Turn to these six-months old articles, and read them again by the light of Leeds; and, by following up these clues out of the difficulty, avoid similar disasters.

In the cases both of Manchester and South London—especially the latter—a good deal of information relating to the circumstances of the strike times afterwards appeared in the columns of the Journal. Nothing of the kind is to be expected from Leeds, where henceforth the nominal managers, as in Bristol, will have their noses kept pretty close to the Union grindstone, and will hardly be able to call their souls their own. The particular reference that we desire to make to the Leeds case at present, is not with respect to anything inside the works or connected with the carbonizing arrangements; but to something beyond. Before doing so, however, let it be noted parenthetically that the Leeds unionist stokers have gone back on monthly agreements. Does anybody think these will be of the slightest use to the employers? Examination of the record of the events preceding the lock-out will show that the trouble began before the expiration of the men's notices. Would it not be so again, and would any reader of these lines envy the superintendents who might be condemned to try to keep the gasholders afloat for a month with men contemplating a strike at the end of the time? To return, however, to the point. In the *Daily Graphic* there appeared, as illustrating the state of Leeds during the lock-out, a picture of a street fight in which strikers, new hands, police, dragoons, &c., were engaged in a regular *mêlée* in the roadway leading to the gas-works; while a detachment of the rioters, occupying in force a railway bridge commanding the thoroughfare, were pitching down sleepers, stones, and all kinds of heavy missiles on the helpless "representatives of law and order" below. If this spirited sketch was anything like a correct delineation of what happened on that eventful day near the Meadow Lane Gas-Works—and it is abundantly borne out by other reports of the affray—one can only wonder at the crass neglect of the most elementary principles of war that allowed a convoy to be caught in such a situation. If the Gas Committee did not know any better, it is amazing that the officers commanding the police and the military had no more sense of what was needed to protect their men. Lack of counsel could no further manifest itself than in allowing a mob to seize such an advantage.

There may have been other displays of bad generalship in this Leeds case, as there were at Bristol; but one such exhibition is enough to explain the defeat that necessarily followed. The plain inference is that when a gas-workers' strike is to be faced, it is not only desirable to engage fresh hands and bring them within sight of their destination, but generalship must be exercised in baffling, meeting, and, if necessary, overbearing all possible mob force disposed to prevent access to the works. Men can be had, provisions can be stored, and most gas-works can be made ready to stand a siege; but what is the value to an army of any amount of material resources, if the General is incapable? Mr. Alderman Gilston told the Leeds Town Council that "the forces of law and order were hardly equal to defending the rights of the citizens;" but it would have been nearer the mark if he had confessed that those who ought to have led these forces were unequal to the duty. It would be an evil day for England if such a condition of affairs as that described by the Leeds Alderman could be truthfully said of the humblest hamlet in the land. Any local authority can be surprised by a sudden riot; but where an emergency involving a probable breach of the peace can be foreseen days in advance, the Magistrates who fail to make proper provision for maintaining order are not fit for their office. This Leeds riot actually lasted for days; and why a sufficient force of special constables was not enrolled to supplement the regular police and military at the disposal of the authorities, when these were thought to be numerically weak, can only be understood on the hypothesis that the weakness was at head-quarters.

It may be asked whether we hold generalship and aptitude for street fighting to constitute a necessary qualification for the officer chiefly responsible for the security of a gas-works. To this we reply that, while he would be none the worse for a dash of that variety of organized common-sense which is called generalship, it is not indispensable that he should possess more of it than is implicated in ability to judge what amount of help he will need on emergency. It is not the gas manager nor the chairman of the gas company or committee who is responsible for the maintenance of order. At the same time, if he is compelled to act in a way that may be deemed likely to lead others to break the peace, it is his duty to concert measures with the competent authority that, in the judgment and on the responsibility of the latter, will suffice to meet the emergency. This remark is a truism; but we see how necessary it is to insist upon it. The news of the collapse at Leeds reminded writers in the London newspapers of the services of Scotland Yard and Mr. Livesey last December. Mr. Livesey, however, has repeatedly declared that, but for the splendid manner in which the police were handled by their own officers on the occasion of the South Metropolitan strike, the result would have been very different. The works were garrisoned by police for nearly a week before the old hands turned out; and thereby much violence and mischief that was brewing for the last few days was prevented. No crowds were allowed to collect outside the gates or block the approaches to the works. Mounted constables barred thoroughfares from which "ugly rushes" might have been made on the entrances. The batches of new hands, converging quietly through the night to the points allotted for their reception, were convoyed by police in sufficient force to surround them where it was found necessary. All was done without a single broken head; and through the whole of the process of re-manning the different works, not a policeman drew truncheon. Contrast this with Leeds.

There cannot be greater cruelty than the employment on such occasions of insufficient force. The anarchist press of London howled, and the Union leaders yelled, at Scotland Yard for the "wholly superfluous display of force," by which the South Metropolitan strike was preserved from rioting to which that at Leeds had been as nothing. Mr. Monro was accused in rabid language of inciting the peaceful strikers to violence by parading too many policemen for the maddest crowd to encounter; but it can now be seen, if the example were needed, what comes of insufficient force badly generalled. The Gas Workers' Union won at Leeds by violence. There is no other explanation of the facts; and it is as well that this should be thoroughly understood by everybody who may at any time be concerned in a similar affair. The Leeds riots show very clearly that our civilization, highly polished as it appears, rests only on brute force. Gas supply, like the safety of life and property, is only guaranteed so long as the forces on the side of law and order can be depended upon to quell the forces of lawlessness. It so happens that at Leeds the questions at issue between the Gas Committee and their rebellious workmen were almost purely matters of money; and the losers could get out of the more pressing of their liabilities by payment. It may be understood, however, that never did the Leeds Gas Committee pay money more grudgingly than they will the costs and compensations of the abortive lock-out. If other gas committees and companies take the example properly to heart, this expenditure may not be altogether wasted. So far as Leeds itself is concerned, however, it will be odd if the ratepayers, who will have to find the money in the end, do not begin to think that there is something radically wrong in the administration of their vaunted gas undertaking.

Mr. A. W. Bean, whose death, in his 67th year, took place at Danson Park, Welling, Kent, on the 1st inst., was Chairman of the Harrogate Water Company. The deceased gentleman was a Justice of the Peace.

The Late Mr. G. H. Osborn, of Bromley.—The will of the late Mr. George Holmes Osborn, the Manager and Secretary of the Bromley (Kent) Gas Company, has lately been proved; the personalty being sworn at between £11,000 and £12,000.

Accounts of the Metropolitan Water Companies.—On Monday last week a return was presented to the House of Commons of the accounts of the Metropolitan Water Companies, made up to the 30th of September and the 31st of December last.

Title and Index to Vol. LV.—The title-page and index to Vol. LV. of the Journal (January to June, 1890) will be ready in the course of a few days; and, as usual, a copy will be forwarded post free by the Publisher, on receipt of a post-card from any subscriber.

NOTES.

A Smoke Washer.

The latest contribution to the smoke abatement systems available for factory-owners is the so-called "smoke annihilator" of Mr. S. Elliott, which is being tried at a wood-moulding works at Newbury, Berks. The apparatus to which this ambitious name is given is simply a washer, connected with a fan which exhausts the smoke from the boiler or other flues, and returns the uncondensable and fixed portion of the products of combustion to the chimney in what is described as a clean and unobjectionable state. The exhaust fan takes the smoky gases from the chimney flue, and passes them into a hollow horizontal spindle which traverses a closed tank partly filled with water. The spindle has numerous holes for the escape of the smoke, and carries radial paddles for beating up the water into spray. The smoke accordingly has to pass through this spray. Exhaust steam is admitted into the box, and supplies a portion of the necessary water; but this is not necessary to the process. The apparatus is compactly mounted; the revolving spindle of the beater in the washing vessel being geared to the fan, so that one belt drives both. The fan is driven at a speed of about 2000 revolutions, and the washer at about 200 revolutions, per minute; the steam required for this purpose being about 1½-horse power, while the apparatus is rated to deal with the smoke from a 100-horse power boiler. Mr. Heaton has analyzed the smoke gases going into and coming from an Elliott washer, and finds that it takes up all the sulphurous and sulphuric acid gases, and the carbon. The water employed is rendered brown and slightly acid. A quantity of sooty scum also accumulates in the washer, containing 70 per cent. of carbon. Besides removing solid and gaseous impurities, the apparatus is also credited with helping the draught of the furnace. It is hardly necessary to remark that washing smoke is an old idea, which has never yet been worked satisfactorily for long together. Such value as there is in Mr. Elliott's arrangement is therefore to be looked for in the efficiency of his washer regarded as a spray-producer; and this is at best a minor consideration.

An American Opinion of Steam-Rollers.

The question of the advantage of the steam-roller in road making is being debated in the United States. Mr. James Owen, Engineer for Essex County, New Jersey, writes to the *Engineering and Building Record* to say that he is not in favour of such an appliance. He contends that the only real argument to be used in favour of a steam-roller is that it is more economical to move a roller of 15 or 20 tons weight by steam than by horse power. This he freely grants; but at this point all comparisons cease. He declares that better results can be obtained by running a 2-ton horse roller over a stretch of newly-laid stone fifteen times than from running a 15-ton roller twice—the hauling in both cases being the same. Mr. Owen acknowledges that the concentrated load of a heavy steam-roller is destructive to bridges, culverts, and pipes; and is of opinion that the constant trituration, as he calls it, of a light roller is preferable to excessive deadweight. He makes roads of broken stone, 1½ inch cube, covered with from ¾ inch to 1 inch of loam or clay packing after a preliminary rolling. The whole is then well rolled with the same 2-ton horse roller, and the general traffic allowed to come on next day. Ruts are made at first, but are immediately attended to, and in a few days the road surface comes down to the desired uniformity of level. The amount of packing and rolling depends on the weather.

A Simplified Spectro-Photometer.

Professor E. L. Nichols has read before the American Institute of Electrical Engineers a paper descriptive of a new photometer, in continuation of his former one on errors of observation with the Bunsen photometer, which was noticed in the JOURNAL at the time. The new apparatus is a "horizontal slit" photometer; and it is, in point of fact, a spectro-photometer in which the polarizing device is entirely done away with. In it the extremely simple principle of the Bunsen photometer is applied successively to the various regions of the visible spectra of the sources of light under comparison. The optical axis of the collimator is horizontal, and at right angles, to the photometer-bar. The slit is horizontal, and lies in a straight line joining the sources of light, which are set up in the usual manner at the ends of the bar. The bar itself is preferably of considerable length; in the original instrument it was 500 centimeters long. In front of the spectroscope slit are placed two right-angled prisms—of the same size, and made of the same glass. Their vertical adjacent edges bisect the slit, and light coming from either end of the photometer-bar is totally reflected by them, and enters the right or left hand end of the slit in a direction parallel to the optical axis of the collimator tube. The two sets of rays thus gathered into the spectroscope from the lights at the ends of the bar are vertically dispersed by the Amici prisms, and appear in the field of view as two vertical spectra standing side by side. Equal wave-lengths are in the same horizontal line; and any desired region may be brought into the centre of the field by an angular movement of the occular telescope. When the instrument is placed at the middle of the bar, between two lights of identical quality and brightness, the two spectra are of equal brilliancy throughout, from red to violet. If the two lights differ in intensity but not in quality, their spectra will differ in brightness by the same amount from end to end; and a position may be found on the bar for which they will be identical throughout. Under these circumstances (which are the only ones wherein the Bunsen method of photometry is strictly applicable), the instrument may be used as a simple photometer; the setting for any wave-length whatever giving the candle power. When the lights to be compared differ both in intensity and quality, ordinary photometric indications do not possess any perfectly definite significance. In this case the brightness of different points of the spectra must be compared. Professor Nichols used the new instrument to compare the light of a Welsbach incandescent burner with that of an Argand, which, as determined by a Bunsen photometer, had a relative brilliancy of 1·701 : 0·015. The following was the result:—

Colour.	Wave-Length.	Ratios.	Probable Error of a Single Observation.
Red	702	0·709 : 0·017	2·45 per cent.
Yellow	589	1·476 : 0·017	1·14 "
"	558	1·760 : 0·023	1·34 "
Green	500	2·395 : 0·047	1·99 "
Blue	466	2·738 : 0·036	1·30 "
Violet	439	3·090 : 0·073	2·35 "

Average 1·76 per cent.

Some further information concerning the uses of the instrument is promised.

Mr. Thos. S. Geere has been elected a Director of the West Ham Gas Company in place of Captain R. W. Pelly, R.N., who died a short time since, having been a member of the Board for 35 years, for 22 of which he was Chairman.

Society of Engineers.—Arrangements have been made for the members of this Society to visit the Royal Arsenal, Woolwich, on the 18th inst. The steamboat *Kaiser* has been engaged to convey the party; and it will leave Westminster Pier at ten o'clock. Luncheon will be served on board.

Glass Water-Mains.—A firm at Prague has introduced water-mains manufactured from glass, and having a coating of asphalte. They are said to be far superior to iron or earthenware mains, there being no incrustation. The mains are also available for drainage purposes.

The Institution of Mechanical Engineers will hold their summer meeting at Sheffield from the 29th inst. to the 1st prox. The reading of papers will occupy the mornings, and visits to works the afternoons of the first two days, and the whole of the third; and excursions to Chatsworth and the Dukeries on the last. The festivities will include the dinner and a *conversazione*. Among the papers set down for reading are the following: "The Loomis Process for Making Gaseous Fuel," by Mr. R. N. Oakman, jun.; "Gas-Furnaces," by Mr. Bernard Dawson; and "The Sheffield Water-Works," by Mr. E. M. Eaton.

The Great American Gas Undertaking.—The gas undertaking lately chartered in New Jersey with a capital of $50,200,000 is the Anglo-American Gas Company, otherwise the United Gas Improvement Company, of New York City. The $50,000,000 was subscribed for, and the $200,000 represents the value of the founders' shares—one of these shares being given with a subscription for 250 shares of the common stock. Only $15,000,000 will, we believe, be paid up, of which $10,000,000 will be expended in buying out the United Gas Improvement Company. We learn that the project to form an English Company to acquire a half interest in this great undertaking has, for the present, been abandoned.

Tests of High-Power Lamps in Brussels.—In a recent number of the *Journal des Usines à Gaz*, the results were published of some tests of four well-known recuperative lamps now in use in Brussels. They were the "Acme" lamp of the Wenham Company, of which two sizes were tried; the "Sylvia" lamp of M. Bus, of which also two sizes were tested; three kinds of the "Lampe Belge," of M. Hamberger; and three of the "Multiplex" lamps of the Franco-Belgian Company. The Wenham lamps were stated to give the light of 1 Carcel (9·5 candles) with consumptions of 54 and 60 litres—in the one case rather less, and in the other rather more, than 2 cubic feet—against 56 and 66 litres with the "Sylvia" lamps, 40, 46, and 60 litres with the Belgian lamps, and 36, 41, and 47 litres with the "Multiplex" lamps. These results are the more interesting inasmuch as they were obtained with lamps of relatively small consumption (200 to 450 litres, or 7 to 16 cubic feet) per hour. It was stated in our contemporary that the figures had been communicated to the Belgian Association of Gas Engineers—thus imparting to them something like an official character. This led the representative of the Wenham Company to bring the matter under the notice of the Society; especially as the results obtained with his Company's lamps were altogether out of accordance with those reported a short time ago by M. Busine, and published in the Society's Transactions, where a No. 2 "Acme" was shown to have produced the light of 1 Carcel with a consumption of 32·5 litres of gas, as compared with 54 litres recorded by the later tester. The President explained that no one had been appointed by the Society to test the lamps and report. An official of the Municipality had carried out some experiments; but they were private. As far as the Society were concerned, all they had in the way of an official report was that presented by M. Busine.

COMMUNICATED ARTICLES.

A CRITICISM OF MR. GADD'S GAS INSTITUTE PAPER.

By F. S. Cripps.

In his paper on "The Principles Involved in the Construction of the Northwich Gasholder," read at the recent meeting of The Gas Institute, and given in the JOURNAL last week (p. 78), Mr. Gadd starts with an assumption that he may or may not be justified in making—viz., that the principles involved in the construction of his spiral-guided gasholder, as well as of the "ordinarily-guided gasholder," have not hitherto been understood by engineers and others. This is a somewhat bold statement, because it leads us to infer that he does understand them, and that the paper he read will give evidence of this. I make bold to assert, and moreover will prove, that his paper neither confutes the principles hitherto held by properly-trained engineers, nor sets forth a new and *correct* theory which is in any degree contrary to them; but, on the other hand, it contains many statements running contrary to the well-known and uncontested laws of mechanics.

True, Mr. Gadd makes quotations, and refers to absurdities long since exploded and confuted; but these cannot fairly be represented as either the past or the present opinions of trained engineers. Of this, there is abundant evidence in Mr. Livesey's letter to the JOURNAL on April 26, 1887, as well as my letters, signed "Theory and Practice," in the numbers for Aug. 30 and Sept. 13 in that year, in the discussion following the reading of Mr. Webber's paper before The Gas Institute in 1887, and in my letter to the JOURNAL for Aug. 14, 1888, on "Wind Pressures on Gasholders." Besides these, we have Sir Benjamin Baker's report on the strains in the South Metropolitan holder, and my own work on the "Guide-Framing of Gasholders," &c.

I must ask anyone sufficiently interested in the subject, to read this article side by side with Mr. Gadd's paper, as, naturally, I cannot quote word for word whole paragraphs from his paper, which otherwise would be necessary in order to make my meaning clear.

I pass over Mr. Gadd's references to others' opinions, and start from the paragraph commencing, "In some of the diagrams before you," &c. (p. 78, col. 2). In brief, Mr. Gadd contends that the tank wall is rigid, and is the "base" of his holder. I reply, so it is of every other holder; the strains are communicated through the guide-framing to the tank wall. The difference is that in Mr. Gadd's holder the *bottom curb* is the medium through which *all* the strain must pass to the tank wall; whereas in the ordinary holder the bottom curb has very little indeed to do with it. In the ordinary holder the strains are distributed round the tank by the standards at places made specially strong to take them. Mr. Gadd's tank is no better for making it impossible to have piers behind the points of strain. In his case, if it means anything, it means that the *entire circumference of the tank wall* must be thickened up, because the rollers do not work up a vertical line, but up inclines practically embracing the whole surface of the tank wall. An ordinary gasholder constructed on the cantilever principle (first introduced by Mr. G. Livesey) is as pure a cantilever as Mr. Gadd's holder. The difference is that, instead of the *gasholding* part of the structure having to do all the work of resisting the strains as a cantilever, it is done by the guide-framing surrounding it.

Mr. Gadd possibly thinks (and the same thought has probably occurred to many) that it would be an advantage for the bell in ordinary gasholders to be restricted or controlled at the base, so that it would have something to resist its lifting on the one side and depressing on the other. This, however, is not at all necessary, because, unless the lifts are very shallow, there is not the slightest tendency for the holder to do this. The bell of the holder is driven and pressed against the guide-framing *horizontally;* the guide-framing *alone* taking all the lifting and depressing strains—each lift of the floating bell being as it were an independent beam, resting on supports at each end, and uniformly loaded, as in fig. 1.

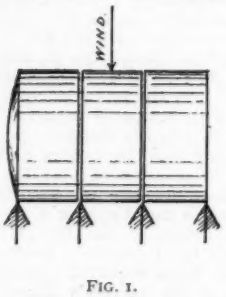


FIG. 1.

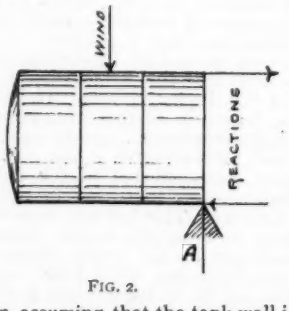


FIG. 2.

But is Mr. Gadd quite right in assuming that the tank wall is doing all the work, and that his bottom curb is not the bottom curb? No strain can come upon the tank wall except that which is given up by the rollers attached to the bottom curb. If there is any necessity for a strong bottom curb in the ordinary holder, there is greater necessity for it in Mr. Gadd's holder. This is evident when we consider that each lift of an *ordinary* holder is a beam supported at each end, as in fig. 1; whereas in Mr. Gadd's holder the entire bell or gas-containing vessel is subject to all the cantilever strains (as in fig. 2) which, in the ordinary way, would be taken by the guide-framing.

Even disregarding the transmitted effect of bending strains (which, however slight they may be, are 36 *times greater on the bell of Mr. Gadd's holder than in the ordinary three-lift kind*), the direct horizontal pressure or shearing force at A—*i.e.*, at the bottom curb—is *six times as much as in the ordinary holder.* With a four-lift holder, it would be eight times. In an ordinary holder, the guide-framing takes up the pressure at various points, and gives it up to the tank (quite independently of the bell) at the bottom; whereas in Mr. Gadd's case, the holder having nothing to press against except at the bottom, all the strains must come through this part—viz., the bottom curb. Therefore, the first implied argument of Mr. Gadd in favour of his holder falls to the ground. Instead of his bottom curb being stronger, and less strained, metal for metal, than in the ordinary holder, it is just the reverse; the forces acting upon it being so much greater than in the ordinary kind, even if we neglect altogether the twisting and wedge-like effect due to the inclined guides. Grooved tangential rollers are equally applicable to both kinds of holders; so that one has no advantage over the other in this respect.

The next advantage claimed is that the spirally-bent rails in the outer lift add strength to the holder-frame. Undoubtedly they do; but at the expense of weight. Diagonal stiffeners could be equally well put into the ordinary holder; but they are not needed, as it is not strained so much. It should be noted that these spiral rails are not only longer and heavier than is usual with vertical stiffeners, but that the vertical stiffeners are adopted as well. This is necessary, as I pointed out in the discussion following the reading of Mr. Livesey's paper before the Southern District Association of Gas Managers in November, 1888,* and subsequently in conversation with Mr. Gadd. Unless vertical stiffeners are adopted, the framework forming the side of the gasholder is only a series of parallelograms, and would be like a girder with half the lattices omitted. It must, of course, be triangulated in Mr. Gadd's holder. At the best, these diagonal rails are but bent struts or ties, and are therefore not well suited for resisting *direct* strain, either tension or compression.

The next paragraph is, I believe, intended as a reply to a doubt I raised as to the strength of the cups and dips. I maintain that in Mr. Gadd's gasholder, the cups and dips are strained to a much greater extent than in the ordinary kind, and that for a large gasholder they must be made considerably stronger than is usual, in order to resist the tendency of the gasholder to distort out of the circle horizontally. Mr. Gadd evidently does not grasp my meaning. I have dealt with it fully in my treatise on the subject, and Sir Benjamin Baker, one of the Engineers of the Forth Bridge, and the author of "Long and Short Span Bridges," "Strength of Beams," &c., whose opinion is certainly not to be slighted, speaks very pithily of these strains (see JOURNAL for Jan. 25, 1881), and demonstrates the horizontal distorting forces in a gasholder, showing them to be by far the greatest factor in the case. Mr. Gadd would appear to ignore them altogether. Much misunderstanding would be swept away if only it were borne in mind that a gasholder is not exempt from the laws of Nature; and that, being a beam or cantilever, it must be subject to the mechanical principles relating to cantilevers, which may be summed up as follows:—

All cantilevers are subject to

(*a*) Tension
(*b*) Compression
(*c*) Diagonal strain
} the effect of transverse or bending stress.

(*d*) Shearing strain, due to direct load.
(*e*) Buckling or crippling strains—due chiefly to the manner and distribution of loading.

It is not fair to argue that a cantilever is strong enough to resist one or two only of the above; it must resist all. It is the last mentioned that Mr. Gadd passes over. He says that "the whole of the strain of lifting, or the lateral strain from wind pressure, need not come upon the cup rings." If the outer lift is not raised by the holder cupping in the ordinary way, but by causing the cup rollers to bear against stops in the guide-rails, as Mr. Gadd suggests, no advantage would be gained, but altogether the reverse. The cup channel which carries the rollers would still have to transmit and resist whatever force the rollers have acting upon them. But this is altogether beside the point. The mode of suspending the outer lift from the inner one, and the strains due to dead weight, have nothing whatever to do with the *horizontal* distorting forces acting on the cups, and must not, therefore, be confounded with them. No gasholder in existence "depends upon the frictional lateral resistance of the cup rings"—the idea is absurd. No good, however, can result from separating the cup and dip so that they do not bear upon, and mutually aid one another. They should be boxed together, so to speak, as much as possible. Whatever pressure comes upon the guide-rails is, of course, transmitted up to the dip; the guides are in this respect like beams, one end of which is supported by the dip. When speaking of the cup or dip, of course I do not refer solely to the sheeting or plates forming its sides, but principally the channel-iron forming what may be termed its backbone.

*See JOURNAL, Vol. LII., pp. 846, 887.

I have now gone through what may be termed the general statements concerning the holder, where it has been contrasted with existing constructions; and I now come to the most important part of the paper, wherein Mr. Gadd attempts to work out the actual strains on the Northwich holder. Here he is lost in vague, inaccurate, and misleading method, altogether foreign to all the known principles of mechanics.

Here I must again ask the reader to follow Mr. Gadd's paper side by side with my remarks thereon.

First as to the effect of wind pressure. 60,000 lbs. uniformly distributed over the entire height of a 40 feet high cantilever is not the same as 30,000 lbs. applied at a point 20 feet high. If half the load is taken, it must be applied at the *extremity* of the cantilever to have the same effect as the whole load distributed. This amount must therefore be *doubled*. The vertical force then is 20,000 lbs., not 10,000 lbs. on each side at points the extreme diameter apart. Then Mr. Gadd distributes this equally on eight points of support. This is wrong—first, because four of the points are on one side of the neutral axis and four on the other, so that each group of *four* would have 20,000 lbs. between them; and, secondly, because it assumes that all the points are at the same extreme distance from the neutral axis, whereas only one, at the best, can be at the extreme distance, the others approaching much nearer the axis, and therefore offering but little resistance (see figs. 3 and 4).

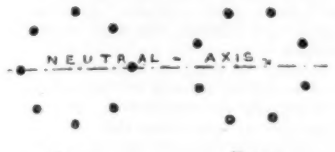


FIG. 3.

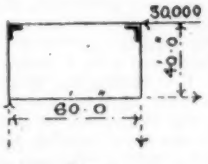


FIG. 4.

FIG. 5.

Surely Mr. Gadd knows that *the pressure on the various points depends on their respective distances from the neutral axis of the system*; and his gasholder cannot get away from this law or principle in mechanics. Even assuming the three points on either side of the neutral axis in fig. 3 to take each an equal share of the load (those *on* the neutral axis are, of course, practically useless when in that position), they would each be subject to a direct "vertical force on each rail, acting in contrary directions on opposing sides," of 6666 lbs.—a very different thing from 1250 lbs., as stated by Mr. Gadd.

Mr. Gadd then deals with what he calls the diagonal forces acting upon the top curb; but I must express myself so mystified by his remarks that I fail to grasp his meaning. If a gasholder is looked upon as a rectangular frame, and, for the time being, considered as having all its parts in one plane (see fig. 5), and that the whole of the tendency to rack out of shape is to be resisted by the top curb—and this is what I fancy he means—the following would be the bending moment tending to open out the angle-iron at the root. $30{,}000 \times 40 = 1{,}200{,}000$ foot-pounds; and if this is divided by the circumference, 2256 inches (although this is an unmeaning performance), we have 532 foot-pounds, or 6384 inch-pounds, acting on a strip of the curb 1 inch wide. It is needless to say that the moment of resistance to opening out of an angle-iron ¼-inch thick would only be 1875 inch-pounds. Therefore, according to this showing, the strain on the angle-iron top curb is 3½ *times the ultimate strength thereof*. The foregoing is the wrong way of treating the strains. The diagonal strains are taken up by the sides and the triangulated framework of the holder as a whole, not by the resistance of the top curb to opening out. But, in passing, it is worthy of remark that little or none of this kind of strain comes on an ordinary gasholder, where the guide-framing is strong enough to support it.

In reference to the possible buckling of the top, I would only mention that thin top sheets are not very substantial things for transmitting a thrust right across the top "edgewise of the metal." Of course, it is the rafters and curb that do this, not the sheeting. The latter merely serves to keep the curb in form, somewhat similarly to the way in which the tension spokes in a bicycle wheel do the rim.

In the concluding portion of his paper, Mr. Gadd refers to a conversation he had with me soon after the discussion at the Southern Association meeting already mentioned. In this, I told him that my treatment of the question in the discussion referred to, assumed that the vertical posts (when there was no guide-framing to support the holder) were like so many posts "fixed" at the base and "hinged" at the top. But I added that if the structure were perfect—that is, if both ends of the posts were absolutely rigidly fixed—the frame would be stronger, when considering the sides as made up of several parallelograms or rectangular frames.. I then made rough sketches similar to figs. 3 and 4 (diagram B in Mr. Gadd's paper), to illustrate my meaning, indicating the + and − strains on the two sides of the posts. Mr. Gadd has evidently forgotten their exact positions. They should be as in figs. 6 and 7, not as in Mr. Gadd's figs. 3 and 4. As the character of the strains is incorrectly shown, I am at a loss to know how the results of his experiments "can be readily demonstrated from figs. 3 and 4."

Mr. Gadd eagerly grasped the point, as no doubt he considered it would, to some extent, upset my arguments. I told him then, and still hold to my statement, that, as gasholders

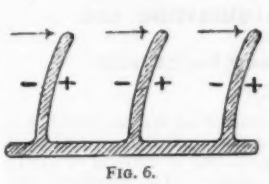


FIG. 6.

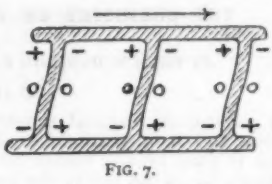


FIG. 7.

are constructed in the ordinary way, it would not be correct practically to consider the ends of vertical guides in outer lifts as perfectly rigid fixed ends (*i.e.*, *encastrés*) either at the top or the bottom; they are something between the two, owing to the nature of the junctions, and the frailty of the parts to which they are attached.

It is not safe to take a theoretical result, derived from an experiment made under perfect conditions, and apply it to a structure which does not satisfy those conditions; and therefore I contend that the net result of the strains would be about as I gave them, if we neglect the assistance afforded by the sheeting or skin of the holder.

It must be borne in mind that, to answer to Mr. Gadd's experiments, the top and bottom members uniting the posts must be absolutely rigid and unyielding. For instance, if the top member be very shallow, it would probably bend as in fig. 8.

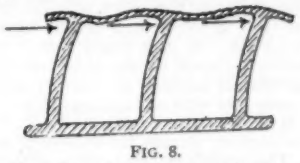


FIG. 8.

But even supposing the whole of the advantage of fixed ends could be claimed, the same advantage is applicable to the ordinary gasholder, only in a greater degree, as will be evident upon consideration.

I cannot pass over Mr. Gadd's statement that "gasholders have not previously been treated as cantilevers." It is only necessary for him to refer to my treatise on the "Guide-Framing of Gasholders" to see that he is in error. Sir Benjamin Baker as long ago as January, 1881, treated gasholders as cantilevers. Mr. Gadd refers to "the tables for gasholder construction," and says he has not consulted them. I am not aware that there are any "tables for gasholder construction" in existence.

Mr. Gadd concluded by saying that most of those who heard him read his paper would be quite capable of determining in detail the strains in his gasholder, now that he had laid before them the principles involved. I am afraid this is extremely doubtful, as the principles laid down by him have been proved in this article to be entirely erroneous.

Perhaps before I bring to a close what I am well aware is a very imperfect, because hurriedly written, criticism of Mr. Gadd's interesting paper, it may be as well to state that I do not bear its author any ill-will or desire to deal unfairly with his invention. What we want to arrive at in respect to these matters is truth. This, I am sure, he will agree is not to be done by smothering up error; and therefore it is well to expose it. "Truth must be dearer than Plato." I would repeat what I have often remarked before—that Mr. Gadd's invention is most ingenious, and he was the first to solve a problem which had hitherto scarcely been thought of. But some inventors do not understand the principles of their own inventions; and if Mr. Gadd is one of these, it does not detract one whit from its extreme ingenuity. Most inventions are probably the result of what may be termed "happy thoughts." Many mechanical toys are very ingenious indeed, and may be termed pure inventions; but as they are only small things, and of trifling cost, they do not provoke much admiration for the inventor. The majority of inventors are probably ignorant of the nature of the strains acting upon the various parts of their structures or toys, or whatever they may be; but this does not, as I have already remarked, detract from either the value or the ingenuity of the invention.

This article must not be taken as an exposition of the principles underlying Mr. Gadd's holder, although much is to this purpose, but as a friendly criticism of his paper—exposing glaring errors therein, so that others who might take the statements of the inventor for granted, may avoid them. Neither does it deal with any points apart from those raised by Mr. Gadd's paper. Possibly, at some future time, I may treat the whole matter scientifically, and show, as well as I am able, what in my opinion are the principles involved in the construction of his holder, and at the same time determine the strains acting upon it, and the best ways of meeting them. As stated in the note at the conclusion of my work on the "Guide-Framing of Gasholders," Mr. Gadd's invention was not referred to in it for the obvious reason that at the time of writing it his system of guiding had not been invented.

The Salford Corporation and Mr. Ellis Lever.—It is stated that notice has been given of the intention of Mr. Ellis Lever to appeal against the recent decision of the Queen's Bench Divisional Court on the motion for a new trial of the action brought against him by the Salford Corporation.

THE CHEMISTRY OF ILLUMINATING GAS.

By Norton H. Humphrys, Assoc. M. Inst. C.E., F.C.S.

XLIII.

A gas-making material should consist as far as possible of carbon and hydrogen. Other elements, whether united with these to form organic bodies, or consisting of mineral or earthy matters, are of no use to the gas maker. The chemical constitution of the material, therefore, affords some indication of its value to the gas engineer, when taken into consideration together with the physical properties. The method known as "proximate analysis," which consists of drying coal at 212° Fahr., for the displacement of moisture, driving off the volatile matter by exposure to a sufficient degree of heat, and igniting the coal until all combustible matter is burnt off, leaving only the mineral matter or ash, possesses the advantage of being readily practised by those who do not possess sufficient laboratory skill to carry out a regular analysis, and of calling for no costly or bulky apparatus. An objection to it is that which applies to all experiments on the small scale—the difficulty of obtaining a really fair average sample. The best way of meeting this, in the absence of proper grinding and mixing machinery, is to operate upon from three to six samples, according to the degree of accuracy desired, and to take the average as the result. In reply to those who may object to the extra trouble thus involved, it may be remarked that if the test is worth taking at all, it is worth taking accurately. If it is really found to occupy more time than it is worth, it should be discarded altogether.

Although the proximate analysis of coal is practised by many engineers, I have only met with one attempt to put it on a satisfactory basis, and that is an article by Mr. Lewis T. Wright,* whose researches on the subject should be carefully consulted by all who practise it. The matter is well worthy of the attention of a Research Committee, under the auspices of The Gas Institute; as a standard method of applying these simple tests, so as to place them on a fairly comparable basis, one with another, would be a great boon. Mr. Wright points out that the loss of weight experienced by exposure to 212° Fahr., or over, is not a fixed and regular quantity. The usual plan of drying substances is to leave them at 212° until they cease to lose weight. A sample of coal, however, not only loses water, but absorbs oxygen from the air, on account of the oxidation of pyrites present in it; and other actions are set up at a comparatively low temperature. A sample dried at 320° shows a different result from one that has not been heated above 212°. By collecting the water in a drying tube, it was found that, after drying at 212° for one and a half hours, the actual quantity of moisture given off was from 0·2 to 0·5 per cent. greater than was shown by the loss of weight. A carefully-conducted series of experiments would possibly enable a degree of temperature, and a time of exposure, to be fixed upon, which would give results sufficiently near the truth for practical use. Mr. Wright goes on to show that considerable care must be exercised in regard to the determination of the volatile matter. The results are affected by the size of the gas-flame as determining the degree of heat applied, the time occupied in heating, and whether or not the coal is powdered. He thinks satisfactory results could be secured by taking about 30 grains of the finely pulverized sample, and letting it form an even layer on the bottom of a thin platinum crucible. To secure this, the crucible must be kept in a perpendicular position. It is weighed without the cover, though, of course, the cover is used during the experiment. A powerful gas-burner is employed; and care is taken to keep the flame as nearly as possible at a given length, so as to ensure uniformity throughout the series of experiments. The heating is maintained for exactly one minute after the gases cease issuing from beneath the lid. The crucible and cover are placed under a desiccator to cool; and the crucible is weighed without the cover as soon and as rapidly as possible. In determining the ash, even the slightest draught must not reach the sample, as it is deposited in a very light and finely-divided form. There is thus danger of some being blown away; and to avoid this, readily incineratable cokes may be treated in a deep platinum crucible, they, if too refractory, may be heated to redness in a wide combustion tube (being placed on a suitable piece of platinum foil), through which a very slow current of air is aspirated.

Mr. Wright also refers to the determination of the percentage of sulphur in coal or coke, and describes methods of determining it. The total sulphur in the coal is disposed of in three ways, that which passes off with the volatile matter, that which is given off as sulphurous acid when the coke is burnt, and that which is retained in the ash. Various other methods have been published from time to time; but as the total sulphur is sometimes under 0·5 per cent., the determination can only be carried out in a satisfactory and reliable manner by a skilled chemist. The chemicals used must be free from the slightest trace of sulphur or sulphur compounds. Within reasonable limits, the proportion of sulphur in a coal is not of sufficient importance to be worthy of consideration. Oxide purification is so cheap that the quantity of sulphur remaining to be removed in the oxide purifiers is not of much consequence; and there is no reason for supposing that any connection exists between the percentage of sulphur found in a coal, and the quantity of sulphur compounds other than sulphuretted hydrogen found in the gas produced from that coal. There are some few purposes to which coke might be applied, if it could be obtained perfectly free from sulphur—such as for malthouses, where the presence of sulphur in the products of combustion is an objection. But at present there is a good demand for coke, without reference to the quantity of sulphur contained in it.

Another simple test of the value or genuine quality of a gas-making material is that of the specific gravity. For ordinary laboratory purposes, the small bottles in tin cases with counterpoise, gauged to contain exactly 500 or 1000 grains of water at 60° Fahr., as usually sold for this purpose, will answer well; but for the testing of commercial samples, it is better to operate on a more extensive scale. A large pair of balances, capable of taking (say) 2 lbs. in each pan, and turning with 0·1 grain, is the prime necessary. Being provided with this, a series of very accurately graduated flasks, in size according to the purposes required, should be obtained. A flask holding 0·1 gallon, or 7000 grains when filled to a line drawn round the neck, is a useful size for determining the specific gravity of oils, naphthas, petroleums, &c. The weight of the flask, when empty, is ascertained once for all, and marked on the neck. It is filled to the mark with the liquid to be tested; the exact level of the liquid being ascertained (with the precautions usual when reading the contents of a burette), and then weighed. The weight of the liquid, divided by 7000, gives the specific gravity. Thus, a sample of petroleum that was found to weigh 6300 grains would have a specific gravity of $6300 \div 7000 = 0{\cdot}900$. As some of the liquids experimented upon are volatile, the flask should be furnished with a sound stopper.

For finding the specific gravity of coal, or other bodies insoluble in water, the plan of weighing a lump of the substance while suspended in water is usually recommended. It is open to the objections of requiring special apparatus that is not used for anything else, and the assumption that any one lump is a fair sample of the whole, which is certainly not the case as regards coal. A preferable plan of proceeding, for estimating the specific gravity of coal, is to collect, from a fair sample, a number of pieces large enough to pass the neck of the 0·1 gallon flask, sufficient to make up a weight of 1000 grains or even more. Assume that we have 1500 grains of coal. After weighing, it may be transferred to a glass or porcelain basin (or the coal may be weighed in the basin), and carefully moistened with water; using a camel hair brush, and turning each piece, so as to displace all adhering air bubbles. If the coal is permitted to remain under water for some time, bubbles will again appear on the surface, even though they have been carefully displaced at first. The reason of this is that the occluded gases in the substance of the coal are gradually dislodged by the water, and the second crop of bubbles is not air adhering to the surface, but gases escaping from the interior. The occluded gases can only be entirely displaced by prolonged boiling; and it is rather a nice question whether the real specific gravity of coal is that indicated after displacing only the bubbles of air adhering to the surface, or after dislodging the occluded gases also. The usual practice is to accept the former alternative; and therefore, having displaced the adhering air by carefully rubbing off each bubble with the brush, we take no notice of any that may subsequently make their appearance. The coal is then carefully transferred into the flask; all the dust and detached fragments being scrupulously washed after it by the addition of small portions of distilled water. The flask is then filled up to the mark, and weighed. It will be found to be heavier than when containing water only. The weight of the contents, instead of being 7000 grains, will be, let us say, 7330 grains. Of these, 1500 grains consist of coal; and the remainder of water. The weight of water present is $7330 - 1500 = 5830$ grains; and the 1500 grains of coal have displaced $7000 - 5830 = 1170$ grains of water. Therefore 1500 grains of the coal occupy the same bulk as 1170 grains of water; and the specific gravity is $1500 \div 1170 = 1{\cdot}282$. Putting the same in the form of a rule, where

x = weight of coal,
y = weight of water the flask is gauged to contain, and
z = weight of contents of flask after introducing coal and filling up to mark,

the specific gravity of the coal is $= \dfrac{x}{y-(z-x)} = \dfrac{x}{(x+y)-z}$

* See JOURNAL, Vol. XLVI, p. 796.

Miss Agnes Kelman delivered a lecture on "Sanitary Homes," at the Balloon Society's Room, St. James's Hall, Piccadilly, last Friday. The lecture was listened to with the greatest attention; and at its close a cordial vote of thanks was accorded to her. In the course of her remarks, Miss Kelman spoke in favour of the use of gas for cooking and heating purposes.

The Last of the Coal Dues.—From midnight on the 5th inst. coal brought into London ceased to pay duty; thus marking the termination of a practice dating "from time immemorial." The duty has varied at different times; but from 1807 to 1889 it amounted to 1s. 1d. per ton, levied on all coal brought into the area of the City or the Metropolitan Police District. It was to have expired on July 5 last year; but a portion of the entire duty, amounting to 4d. per ton, was, it will be remembered, allowed by Parliament to be levied for another year, in order to aid in meeting the deficiency connected with the Holborn Valley improvements.

TECHNICAL RECORD.

EXPLOSIONS IN COAL BUNKERS.

At the Royal United Service Institution, Whitehall Yard, on the 4th inst., Professor VIVIAN B. LEWES, F.I.C., F.C.S., of the Royal Naval College, Greenwich, gave a lecture on "Spontaneous Ignition and Explosions in Coal Bunkers."

The author explained at the outset that he had had the honour, at the last meeting of the Institute of Naval Architects, of reading a paper on the "Spontaneous Ignition of Coal Cargoes,"* and inasmuch as the remarks he then made had been criticized as though they applied to coal bunkers, he was glad of the opportunity afforded him by the Institution of stating his views on a subject which was becoming daily of greater importance in the mercantile marine, and would probably before long demand attention in the Service. He pointed out that, in the fast ocean steamers, it is now an event of frequent occurrence for the contents of the bunkers to spontaneously ignite; while in the Service such a thing is practically unknown—an occasional explosion of gas being the worst trouble to which the coal stores of our naval monsters have given rise. In order to explain this apparent discrepancy, the author directed the attention of his audience to the causes which give rise to the so-called "spontaneous ignition of coals," and traced the particular circumstances which go to increase the tendency to it. This portion of his lecture was mainly a reproduction of the section dealing with this subject in the one already noticed. He then pointed out that the conditions under which coal is placed in the bunkers of modern steamers and war-ships are so totally different from those existing in a collier, that no comparison can be drawn between them. In the coal bunker, the question of mass, which plays so important a part in a hold laden with coal, is almost entirely eliminated, as from 50 to 400 tons would be about the capacity of any ordinary bunker; and it has been shown before that the cases of spontaneous ignition in masses of coal of less than 500 tons, do not amount to more than ¼ per cent., and the question of initial temperature becomes the one important factor. In order to prevent spontaneous combustion, the temperature of the bulkhead in contact with the coal should not exceed 80° to 90° Fahr.

The author next proceeded to show that the question of explosions in coal bunkers and in the holds of coal-laden ships is a subject totally distinct from that of spontaneous ignition. He explained that during the conversion of woody fibre derived from various forms of vegetation into coal, considerable quantities of a gaseous compound of carbon and hydrogen—called methane, marsh gas, or light carburetted hydrogen—is evolved; and as the action has been spread over long ages, most of this gas has found its way to the surface of the coal seam, and has diffused itself through the superincumbent soil and escaped. But a portion has been occluded in the pores of the coal itself, and some also imprisoned in small cavities and fissures in the coal. The occluded gas is only given off slowly; and with certain coals a slow discharge from its surface continues for some time after its exposure to the ordinary atmospheric pressure—becoming more rapid with a fall in the barometer or with any great increase in temperature; so that if a freshly-won coal be at once stored in an enclosed space, such as the hold of a ship, a certain proportion of marsh gas is nearly always to be found present in the air. This gas, when pure, is perfectly non-explosive, and burns quietly with a faint luminous flame; but when mixed with ten times its own volume of air, and a light applied, it explodes with a force equal to about 210 lbs. per square inch. Another cause which tends to increase the danger of explosion is that if the air is charged with fine coal dust, less than 1 per cent. of marsh gas mixed with it gives an explosive mixture, and also extends the area of explosion.

Having indicated the main factors which operate to cause explosions in collieries, coal ships, and bunkers, the author dealt specially with the two latter cases. He showed that in both colliers and coal bunkers the risk of explosion is greatest during the first ten days after shipment. In fact, the largest proportion of explosions have taken place before the vessel has left harbour, or immediately afterwards; and they have been caused by the coal being loaded too soon after being worked, and while still giving off gas, which, mingling with the air in the hold, has formed with it an explosive mixture that has been ignited by the careless introduction of a light, or else the gas from the hold has leaked through faulty bulkheads into the other parts of the ship, and, coming in contact with fire, has exploded. In considering the precautions to be taken to prevent such explosions, everything must, the author thought, depend upon the vessel. If the vessel is a sailing ship, with at best a collision bulkhead and a partition aft, then it is obviously impossible to prevent the gas given off from the coal from penetrating to other parts; and the only precautions which can be taken are to make sure that at least a month has elapsed since the coal left the pit, and to give ample surface ventilation during the first few days after shipment, during which time the breaking of the coal incidental to loading might, by exposing fresh surface, have caused a slight liberation of occluded gas. In ships built for the carriage of coal, the portions of the vessel in which the coal is placed should be made as gas-tight as the tanks of a petroleum ship; and if the bulkhead nearest the engines were made double, and with water circulation, this could easily be done—the only communication with the open air when the hatches were closed being a 2-inch pipe led a considerable height up the nearest mast, so as to be well out of the reach of any flame. In such a hold, the hatches should be well battened down gas-tight as soon as the coal is taken aboard, and not opened until the vessel arrives at her destination, when the precautions before enumerated should be taken before any light is allowed in or near the hold. The author expressed the opinion that if the precautions he had indicated to prevent ignition were carried out in conjunction with the foregoing simple precautions against explosion, fires in coal cargoes and bunkers would soon be things of the past. He strongly advocated for the bunkers of all new vessels the adoption of the double bulkhead and water circulation to such portions as impinge upon any unduly-heated part of the hold, and advised that all bulkheads should be made gas-tight. In bunkers containing not more than from 300 to 400 tons of coal, as thorough ventilation as possible should be obtained by fitting water-tight air-pump ventilators in the deck above the surface of the coal; while inlets for as cool air as possible should be provided at the bottom of the bunkers, and, where necessary, air driven in from the fan. He thought that under no conditions should any but safety-lamps be used in coal holds or bunkers; and if the faintest smell of coal gas was observed, it should be taken as a warning that the bulkheads were not gas-tight, and the hatches to the hold should be at once removed, and kept off for several days, to allow thorough ventilation of the surface of the coal.

Professor Lewes summed up his remarks as follows: Where perfect ventilation can be secured, and a cool fresh current of air made to continuously pass through a mass of coal, no risk of ignition or explosion exists, as the coal will be kept below the temperature at which oxidation is likely to take place to any serious extent, and any gas given out by the coal will be swept away. Imperfect ventilation, on the other hand, is the greatest source of danger; a limited supply of air furnishing enough oxygen to carry on oxidation without being able to lower the temperature, and so causing ignition, while the air forms an explosive mixture with any marsh gas which may be given off from the coal. In a coal cargo, perfect ventilation is impossible on account of the mass of coal present; and therefore the hold should be battened down, and everything done to prevent imperfect ventilation—gas-tight bulkheads being a necessity for the purpose. In coal bunkers, on the other hand, on account of free access being obtained to both the top and bottom of the coal, and also the small mass present, perfect ventilation is possible, and should be attempted; while the water bulkheads will do away with any undue rise of temperature.

*See JOURNAL for April 8 last (p. 645).

THE BOARD OF TRADE AND ELECTRIC LIGHTING.

In the JOURNAL last week, we published the first portion of the paper, under the above title, recently read by Major Cardew before the Institution of Electrical Engineers. We now give the remainder, dealing with the nature and mode of supply and the regulations to be adopted to ensure safety, and describing the standardizing laboratory established by the Board of Trade.

In the old Orders, two systems of supply were mentioned—viz., the "parallel" and the "series"—meaning constant-pressure and constant-current systems respectively. Now no system is specified, except that it must be one approved by the Board of Trade. A new sub-section was added to this last year at the instance of the telephone companies, by agreement with the promoters, for the protection of the telephone circuits against interference by induction or otherwise; they being naturally rather alarmed at the proposed general use of alternating currents. In the "Works" clauses, I need only mention that in the new model it is proposed to give powers for the construction of "street" boxes in place of "distributing" boxes. The special power taken is necessary, I believe, because these boxes come up to, and may come above the surface of the ground. Also, that the prohibition of overhead wires, introduced last year, is inserted in the new model for companies, with the alteration that the time allowed for the removal of existing overhead wires is reduced to one year. But they may be erected or continued in use with the consent of the local authority. This prohibitory section is based upon, and really does not go beyond, section 14 of the Act of 1882. The "Compulsory Works" clauses provide generally that the undertakers shall do something substantial towards carrying out their undertaking within a specified time, under penalties of fine or revocation of the Order. The Board of Trade, however, must, in the case of a company, be moved to exercise its power of revocation by the local authority, except in the last model, where this has been altered; while in the case of a local authority being the undertakers, the Board of Trade has not hitherto, so far as I am aware, thought fit to exercise its power of revocation for non-performance of works within the required time—probably considering the plea a valid one that the practical knowledge and experience of electrical distribution was not sufficient to justify any expenditure of public funds. This plea, however, is

obviously daily diminishing in force. In nearly all Orders the specified time within which mains have to be laid in certain streets is two years. It is three years in the Birmingham Order of last year; but all streets within the area are included. The Liverpool Order is also an exception. In the old Orders, two years constituted the period that had to elapse before any supply could be requisitioned in other streets; and six months more are allowed to comply with the requisition. In last year's London Orders and the new forms, however, supply can be requisitioned after eighteen months, with six months for compliance; so that persons in streets not scheduled can get a supply at the same time as those in scheduled streets. Also, in the recent Orders, as already mentioned, supply can be requisitioned for any part of the area included in the Order; whereas in the old Orders it could only be requisitioned for the A district. There is a slight variation, too, in wording, which may be important—viz., whereas in the old Orders mains were to be laid *in* every street, now it is *throughout* every street. The requisition to lay distributing-mains in any street has to be signed by a number of persons, which number is a very variable quantity in different Orders. Thus, in the old Orders of 1883, it was two or more owners or occupiers in the case of an Order given to a company or person; and the owners or occupiers of not less than one-fourth of the premises in the street in the case of a local authority. In the Chelsea Order of 1886, it was six or more owners or occupiers. Last year the Board of Trade reverted to the former practice both in the case of companies and local authorities, expect in the Birmingham and Liverpool Orders, where no power of requisitioning is given to owners. These two Orders are very exceptional in respect of these clauses. This year, in the model forms, which are not intended to apply to London, it is proposed to follow the precedent of the Chelsea Order, and to require six signatures to a requisition; the number being the same both for local authority and company Orders. After the requisition clause follows a long clause intended to provide that the undertakers shall, if they so require, be guaranteed by the persons making the requisition a return for their outlay, in laying the requisite mains, of 20 per cent. per annum for three years in the old Orders, two years in the London Orders, and again three years in the new Model Order.

After these "Compulsory Works" clauses come a few clauses headed "Maps;" and then, in the old Orders, "Regulations as to Supply on the Parallel System." These regulations are not inserted in any of the recent Orders, but are issued separately with the safety regulations. Then we come to some clauses headed "Testing" in all Orders up to this year; but in the new models, an improved arrangement has been followed, and "Supply" comes next to "Works," which certainly seems a more logical sequence; also the clauses applying to the appointment and duties of electric inspectors are now put under a separate heading. Taking these clauses first, the appointment of electric inpectors is vested, in the case of all Orders to companies, except the London Orders, in the local authority; in the London Orders, it is vested in the County Council; and in all existing local authority Orders, in a court of summary jurisdiction, moved either by a consumer or by the undertakers themselves. In the new Model Order this appointment is vested in the Board of Trade. In case of the local authority not appointing an inspector, or imperfectly attending to inspectional duties, there is a provision in all company Orders for appointment—in some cases, by a magistrate; in others, by the Board of Trade. In the new Model Order a clause has been added specifically stating that the Board of Trade may appoint an inspector for purposes of any inquiry on an accident or as to safety. I think it is obvious that the Board of Trade has in any case, whether expressed in the Order or not, the right to make inquiry as regards safety. All local inspectors are to be paid by the local authority, or the County Council for London; but fees may be charged, by means of which part, at any rate, of the cost of inspection will be recouped. Inspectors may be appointed from time to time for particular services, or the appointment may be continuous. It is rather difficult to see how this matter will work in small towns where there may be no resident electrician unconnected with the undertakers, or, at any rate, none who would care to undertake the job for such remuneration as could be offered without unduly increasing the cost of the supply, since the expenses of inspection must, in one way or another, be borne by the consumers. Probably one electrician will secure the appointment for several towns not very far apart, and reside in a convenient locality for his district. It will be something like the birth of a new species; and some follower of Darwin will in the next century write an exhaustive monograph on the genesis of the electric inspector, showing how he came to differentiate from ordinary mortals, how he gradually acquired an extra sense warning him against high pressure, &c. The duties of electric inspectors are clearly defined in the new Model Orders; as are also the methods of testing and inspection for the establishment of testing-stations at various points in the area, either by the undertakers or by the local authority. The practical use of these stations is obviously to obtain a record of the variations of pressure at different points in the system, and of the duration of any abnormal pressure or stoppage of supply. The best solution appears to be to have a recording voltmeter at each station, which might be made in the shape of a pillar-box; and possibly an indicating voltmeter exhibiting the pressure at any time would be a welcome addition. I consider that the production of a thoroughly trustworthy recording voltmeter is distinctly a desideratum for the improvement of electric supply. There appear to be very few such instruments in use at the present time. In all Orders, I think, there is reserved an appeal to the Board of Trade against any report of any electric inspector. It is to be hoped that this power will be used with discretion, as the electrical staff of the Board of Trade is strictly limited at present.

Now, taking the "Supply" clauses, we have, first, that any owner or occupier of premises situated within a certain distance of any district main can demand a supply. This distance, in the 1883 Orders, is 25 yards; in the London Orders and the new forms, 50 yards. He may be required, however, to pay the cost of service lines beyond a distance of 30 feet in the old, and 60 feet in the London and new Model Orders. He must name a maximum current in the old Orders, or a maximum power in the new, so that the proper size of service lines may be laid; and this maximum must not be larger than what may reasonably be expected to be the consumption on the premises. If afterwards he wishes to go beyond the declared maximum, he must be prepared to pay for any alteration of service lines or apparatus thereby rendered necessary. The person requiring a supply must also be agreeable to make a contract to take and pay for a supply for at least two years of sufficient amount to pay 20 per cent. on the outlay incurred by the undertakers. Then follow provisoes as regards security for payment, prohibition of improper use of the supply, and a very important one added last year. The "Price" clauses have been considerably affected by the supply being now considered a supply of energy, and not, as formerly, of electricity. I will give the clause as it stood in the old Orders and in the London Orders:—

31. The undertakers may charge for electricity supplied by them to any consumer, otherwise than by agreement—(1) By the quantity of energy contained in such supply; or (2) by the actual quantity of electricity so supplied; or, unless the Board of Trade from time to time otherwise direct, (3) by the number of hours during which the supply of electricity is actually used by such consumer, and the maximum current with which he is for the time being entitled to be supplied.

50. The undertakers may charge for energy supplied by them to any ordinary consumer otherwise than by agreement—(1) By the actual quantity of energy so supplied; or (2) by the electrical quantity contained in such supply; or, unless the Board of Trade from time to time otherwise direct, (3) by the number of hours during which the supply of energy is actually used by such consumer, and the maximum power with which he is for the time being entitled to be supplied.

In the new Model, the method (3) has been altered as follows:

32. The undertakers may charge for energy supplied by them to any ordinary consumer, otherwise than by agreement—(1) By the actual amount of energy so supplied; or (2) by the electrical quantity contained in such supply; or (3) by such other method as may for the time being be approved by the Board of Trade.

The reason for this is that the old method (3) is decidedly wasteful; and, if generally adopted, would lead to far more energy than was necessary being supplied from central stations. Except in special cases, such as lighting of shops and business premises, it should be noted that the consumers are free to make any agreement they prefer as to the price to be charged and the method. But they have a right to be charged in accordance with methods (1) or (2); and the undertakers are always bound by the undue preference clause.

The meter clauses have hardly been altered at all; and it is, in my opinion, proof of the very great care and acumen with which these clauses were originally drawn—so far back as the year 1883—that no really satisfactory improvement has yet been proposed. These clauses will repay very attentive study. They are sometimes looked upon as stumbling-blocks; and it is said that they are unintelligible, and will not work. But I am afraid these difficulties are rather due to want of study and defects of meters than to the clauses themselves. Any number and description of meters may be used both by consumers and undertakers; but only one meter is to be employed for ascertaining the value of the supply. This is to be a meter certified by an electric inspector appointed under the Order. Note that it cannot be certified by anyone else. The inspector must certify three things: (1) That the meter is of some construction and pattern approved by the Board of Trade; (2) that it has been fixed and connected to the service lines in some manner approved by the Board of Trade, which must, therefore, in approving any pattern of meter, prescribe in what way it is to be fixed and connected to the service lines; (3) that it is a correct meter. In making this last declaration, the inspector, in my opinion, may reasonably take account of, and be guided by, any mark or certificate attached to the meter, showing that it has been thoroughly tested and found sufficiently accurate to be pronounced a correct meter in some standardizing laboratory, or he may himself carry out the necessary test in a laboratory. It is obvious that he cannot thoroughly test it in the consumer's cellar, and also that the words "a correct meter" cannot be held to be only applicable to a meter that was absolutely perfect throughout its range. The undertakers are to supply the consumer, either by purchase or hire, with a meter on demand, and procure its certification. No consumer is allowed to connect or disconnect the meter used for ascertaining the value of the supply without giving 48 hours' notice to the undertakers, under penalty. If this meter belongs to the consumer, he is to keep it in proper order; but if it is hired from the undertakers, they must maintain it. In either case they may remove it for testing—all expenses connected with the removal being paid by

the consumer if the meter turns out to be faulty, and by the undertakers if it is in proper order; and any other meter or apparatus placed by the undertakers upon the consumer's premises for the purpose of ascertaining or regulating the supply of energy must be of some construction and pattern and connected in a manner approved by the Board of Trade.

The only other point in the Orders of much electrical interest is the price schedule. In this the definition of the Board of Trade unit has remained unaltered, except the simplification of the wording. Last year there was some agitation to have the amount of the unit increased tenfold. The point was referred to your Council, who did not recommend the alteration; and the Board of Trade very willingly left it as it was. Of course, undertakers are at liberty to make agreements for a price per 10 units, provided that the charges do not exceed the rates laid down in this schedule. In the London Orders of last year, there was added to the second section a proviso to enable the standard pressure on the mains to be taken into account in assessing the value of the supply where this pressure is a high pressure, and the energy is transformed; but in the new Model Order, this section has been much simplified by the introduction of a new term—viz., the declared pressure at the consumer's terminals—which it is proposed to deal with in the new regulations.

Safety regulations were embodied in the old Orders, and were in great detail; such points as the distance apart of terminals, and the maximum current to be taken from any pair of terminals, being specified. The pressure on distributing mains and service lines was not to exceed 200 volts continuous, or 100 volts alternating; and no portion of any electric line placed above ground, and not enclosed, was to be at a pressure from earth exceeding 200 volts. The St. Austell Licence of 1885 is, I think, the first Licence or Order in which separate regulations have been issued; and the same form has been used in the Kensington and Knightsbridge Order of 1889 and the St. James's Licence of 1888, and nearly the same form in the Chelsea Order of 1886. These are more general in character. The limit of low pressure has been raised to 300 volts continuous, while alternating currents are not to be used, except with the approval of the Board of Trade, and under such further regulations as may be considered necessary. A very important innovation has also been introduced in these regulations, providing that the undertakers shall cut off any consumer upon whose premises they find that a leakage exists having a resistance to earth of less than 5000 ohms. This is, to some extent, a departure from the policy of the Board of Trade to leave the regulation of the circuits on private premises to the insurance companies. But, unfortunately, electricity does not conform to these arbitrary distinctions; and a bad leak on a consumer's premises is just as much a source of danger and difficulty as one on the main outside—in the case of direct supply systems, at any rate.

The general regulations for overhead wires, made under section 4 of the Act of 1888, are pretty generally known at the present time; and I need not dwell upon them. As you are aware, they were thoroughly revised by your Council, who have also given their powerful assistance to the Board of Trade in the matter of some new proposed general regulations for undertakers of electrical supply, which, however, are still under discussion. The principal features of the new draft regulations are: (1) The division of the various systems of supply into three classes—viz., low pressure, high pressure, and extra high pressure. Low pressure is to extend to 300 volts continuous or 150 volts alternating; high pressure, from above this to 3000 volts, either continuous or alternating—that is, to as high a pressure as we have had practical experience of in distribution systems; extra high pressure above 3000 volts. (2) A general provision that where high-pressure conductors or apparatus are exposed in such positions as to be possibly touched by persons, or brought into contact with low-pressure conductors, they shall be entirely enclosed in strong metal casing efficiently connected to earth.

Supply regulations have been subjected to less alteration than the safety regulations. The variation of standard pressure permitted has been reduced; and in the new draft it is proposed, as already stated, to introduce the idea of a pressure to be declared at the consumer's terminals, which is not to vary more than 4 per cent., and the variation of which may be tested for the consumer, on his application, by the electric inspector. It is also proposed to take advantage of the powers of the transformer system, and provide that the consumer supplied from a transformer on his premises shall have the choice of two pressures given him, one about half the other. No doubt many of the regulations that have been made are open to criticism; but I would point out that they are in every case the result of very careful consideration, and that observations on them from many different points of view have been submitted, and given, as far as possible, their due weight. It is not unlikely, therefore, that a criticism, even from a high electrical authority, may be unjust and erroneous, from the critic not being acquainted with all the circumstances and conditions which have guided the Board of Trade; and it should also be borne in mind that the Board are empowered to alter any regulations issued by them, or to repeal them and issue fresh ones, should the progress of electrical discovery and further experience make such a course desirable. And whatever imperfection may become apparent in these regulations, I can confidently affirm—and I feel sure that this proposition will receive the support of those among you who have experience of its methods of procedure—that the Board of Trade has been guided solely by the desire to do the duty imposed upon it by Parliament, and to serve the best interests of producers and consumers alike.

I should now like to say a few words about the standardizing laboratory. You are probably aware that the Board of Trade have, in deference to the wishes of the large body now interested in practical applications of electricity, as expressed by a powerful deputation to the President last year, undertaken to provide something in the nature of a testing establishment for instruments intended for the measurement of electrical quantities, analogous to the Standards Department of the Board of Trade for weights and measures of the more gross and material quantities. They have also obtained powers under the Weights and Measures Act of last session to undertake such testing and verification, and to charge fees for it; so that these verifications, whatever their scientific value, will possess a legal value. A general scheme for the scope and working of this laboratory was drawn up very carefully last year by a Committee of your Institution, in connection with which I should like to mention especially the hard work done by Dr. Fleming, in a cause which he has given abundant proof that he has at heart. The general idea embodied in this, in which I personally entirely concurred, is that the thing should grow from small beginnings. What we hope to do in this laboratory is, first of all, to get the true values of the electrical units, within a very small possible percentage of error. We are not tied to the so-called legal units, which I may remark have no legal value in England; but, with the assistance of Lord Rayleigh and the Standardizing Committee of the British Association, we hope to get even nearer the truth than was arrived at with this set of units. Secondly, having got there, we hope to keep there by well-devised checks and frequent reference to the fundamental measurement. This, as we are at present advised, will be the measurement of current by the quantity of silver deposited from solution in a determined time. Thirdly, so soon as we are satisfied that sufficient accuracy and permanence has been arrived at with our instruments and methods, we shall be ready to receive instruments, either for simple verification in the case of ordinary commercial instruments, at a small charge for each reading, or for thorough testing and certification in the case of instruments submitted as sub-standards. The rules and charges have not yet been drawn up; but it is probable that instruments will be required to be marked with a clear and intelligible scale—whether of degrees, or volts, or amperes, is quite immaterial; the extreme range of the instrument must be given approximately, and whether it is intended for alternating or continuous currents or pressure, or for both. The reading given by the instrument on its own scale for each current or pressure asked for will be taken, probably in all cases both with increasing and with decreasing readings. No extreme accuracy will be guaranteed for these readings; but it is hoped not to exceed an error of ½ per cent. from the true value. Of course, in the case of ordinary commercial instruments, we should give no sort of guarantee that the instrument will remain constant for any time, or under different conditions. Sub-standards will be subjected to long and rigorous testing, including the determination of their variation under different temperature, and the permanence of their constants. I am afraid, however, that in most cases there will be some difficulty in giving any guarantee of the constancy of an instrument after it has passed out of our hands. The power for laboratory purposes will be supplied from two batteries of accumulators—one of four very large cells simply to give steady continuous currents up to 2000 amperes; the other, consisting at first of 100 smaller cells, will be used directly for continuous pressures up to 200 volts, and also to run the machinery. The machinery referred to is two pairs of dynamos, one of each pair being energized by the cells as a motor, and driving the one connected to it as a generator. One of these generators will be an alternate-current machine, and the other a high-pressure continuous-current machine. In connection with the alternate-current machine, we shall have a set of transformers. In this way we hope to get currents practically as steady as if taken direct from the accumulators; and in the case of alternating currents and pressures, any frequency within the limits of practice. The limits we propose to work up to at first are: Continuous current, 2000 amperes; continuous pressure, 200 volts; alternating current, 500 amperes; alternating pressure, 200 volts.

Mr. J. W. Portass, Manager of the Haverhill Gas-Works, has been appointed, out of 80 applicants, Manager of the Bishop's Stortford Gas-Works, and will undertake the duties as from the 1st prox.

The Spiral System of Guiding Gasholders.—The Middlewich Gas Company and the Matlock Bridge Gas Company have arranged to adopt the Gadd and Mason system of spiral guiding for the new holders they are about to erect.

Deaths from Electricity in New York.—Last Saturday, a Parliamentary Paper was issued containing copies of letters which have passed between the Foreign Office and the Board of Trade with reference to deaths from electric currents in the United States; also extracts from the records of the Health Department of New York, setting forth the circumstances attending the deaths of sixteen persons from electricity in that city between Jan. 1, 1887, and May 15, 1890.

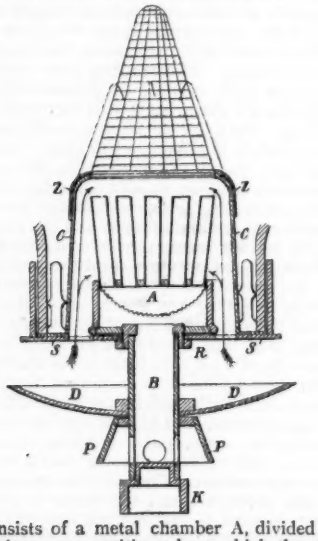
REGISTER OF PATENTS.

Water-Meters.—Kent, W. G., High Holborn, London. No. 12,036; July 29, 1889. [8d.]

This water-meter is constructed with an outer casing in two parts—one adapted to be connected with the supply-pipe on one side and with the delivery-pipe on the other; the other part of the casing being a cover fixed upon the first part by bolts, and having in it a cavity in communication with the delivery-pipe. The measuring part of the meter forms a partition between the supply and the delivery cavities of the casing; and it is held in place by flanges shut in a recess in the joint between the two parts of the casing. The measuring part of the meter consists of a cylindrical chamber as to about two-thirds of its circumference with an enlargement as to the remaining portion. It is closed at the ends; and the water to be measured enters it from the casing by an aperture in one of its ends, and passes out into the delivery cavity in the cover by an aperture in the other end. The measuring chamber contains a cylindrical boss rotating about a stud eccentrically placed within the chamber. The boss is contained in a cavity in an oval piston or partition which both rotates with or about, and slides longitudinally upon, the boss; one or other of its ends meanwhile being always in contact with the walls of the measuring chamber. This piston, with the aid of an abutment or flap, which is connected by a hinged or flexible joint with a projection from the wall of the chamber, serves at all times to separate the inlet from the outlet apertures of the measuring chamber; but the water is able to pass, in consequence of the revolution of the piston within the chamber. The cavity in the piston is divided into two parts by the boss within it. One part overlaps the inlet aperture, and the other the outlet; consequently, the water pressure within the piston tends to keep its leading end in contact with the wall of the measuring chamber. In order that the water pressure may not force the piston against the upper end of the measuring chamber, double passages are formed—that is to say, there is an inlet passage at the exit end of the measuring chamber, and an outlet passage at the inlet end; but these extra passages are covered with hoods, and serve only to equalize the action of the water upon the two faces of the piston. Upon the upper face of the piston, there is a peg; and this, as the piston rotates, drives counting mechanism mounted upon the cover.

Incandescent Gas-Burners.—Clamond, C., of Paris. No. 12,091; July 30, 1889. [8d.]

This invention relates to the now well-known Clamond incandescent (magnesia) gas-burners; the present improvements having for their object "to simplify the construction of the burners, while affording the same degree of efficiency; thereby obtaining comparatively inexpensive burners, of moderate size, and easily manipulated."



The burner consists of a metal chamber A, divided into two compartments by a wire gauze partition, above which the chamber carries a series of metal tubes open at both ends, so as to communicate at the lower end with the interior of A. This chamber is fixed on the upper end of a tube B, which constitutes the tube of a Bunsen burner. It is fixed at its lower end on a cap K, which is screwed on to the gas-supply pipe, and from which the gas issues into the tube B through small holes. The tube B has also lateral holes through which air enters, so as to mix with the gas flowing to the burner. The mixture then rises into A, passes through the wire gauze partition, and up the vertical tubes, on issuing from which it burns with a corresponding number of separate flames. These chambers A and tubes are surrounded by a metal casing C, the base of which is formed so as to be secured to the perforated base S of the gallery that holds the glass chimney. On to the open top of the casing is fitted the base Z of the magnesia cage, the opening of which is of the same size as the opening of the casing, and is situated slightly above the tops of the vertical tubes. The tube B, chamber A, and plate S are all secured together by a screwed piece R, which is, by preference, a bad conductor of heat—such as steatite. The tube B is screw-threaded at the middle part of its outer surface, to receive two screw-washers, between which is held a saucer D; the lower washer also supporting a cone P.

The burner operates as follows: The mixture of gas and air being supplied to the burner, it is ignited at the top of the vertical tubes; and a small explosion might ensue on lighting, and extending downwards might set fire to the gas issuing through the holes, and do away with the proper action of the burner, except for the chamber A, which has for its object to uniformly distribute the supply of combustible mixture coming from the tube B, while the interposition of the wire gauze partition gives a sufficiently extended surface to afford the necessary number of small openings through it for the free passage of the mixture. The flames issuing from the vertical tubes heat to a white heat the magnesia cage; and the heat radiated from the interior of the cage, and that transmitted by the flames, is communicated through the tubes to the chamber A and also to the casing C. But it is prevented from being effectually transmitted to the tube B by the interposition of the non-conducting piece R. The air drawn in by the draught of the chimney rises between the casing C and the chamber A, and becomes heated by contact therewith. It is then distributed among the vertical tubes so as to be highly heated before coming in contact with the flames. Part of this air passing up along the surface of the casing C is made to impinge externally upon the flames, as indicated by the arrows, and thereby causes them to be directed somewhat inwards, which is necessary for effecting a uniform incandescence of the magnesia cage.

Operating Gas-Engines.—Hoelljes, H., of New York. No. 12,447; Aug. 6, 1889. [1s. 1d.]

This invention mainly consists of: (1) A method of operating a gas-engine by compressing a certain charge of air or neutral gas into a heating chamber, compressing a certain charge of explosive mixture, igniting this mixture, and causing it to enter in an ignited state into the heating chamber, in which the whole charge of compressed air or neutral gas is already contained, thereby heating the air or neutral gas, and finally discharging the heated compressed air or neutral gas and the products of combustion into a power cylinder, causing them to move a piston. (2) A method of heating a charge of compressed air or neutral gas, by introducing the charge into a heating chamber, and causing an ignited explosive mixture consisting of inflammable gas or vapour and air, to enter into the heating chamber in which the whole charge of compressed air or neutral gas is already contained. (3) A method of preventing the dilution of the explosive mixture in a gas-engine, by compressing a charge of air or neutral gas into a heating chamber, and introducing an ignited explosive mixture into the chamber in which the whole charge of compressed air or neutral gas is already contained.

The Treatment and Distillation of the Ammoniacal Liquor of Gas and other Works, the Manufacture of Sulphate of Ammonia therefrom, and the Apparatus to be Employed therein and for the Prevention of Nuisance in such Manufacture.—Ellis, A. W., of Queen Victoria Street, London. No. 13,003; August 17, 1889. [1s. 3d.]

The specification of this patent is very long—extending to 16 pages, with 6 sheets of illustrations. It contains much matter of interest generally, apart from the particular references to the apparatus claimed as an invention.

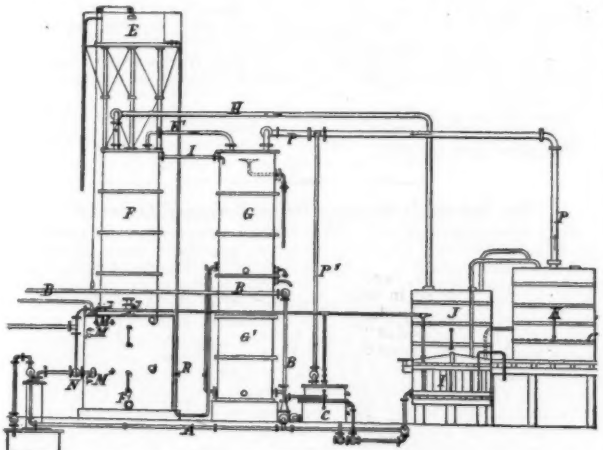
In his general introduction, the patentee says: The total ammonia contained in the ammoniacal liquor of gas-works does not usually exceed 2·5 per cent., the volatile portion of which is commonly (though perhaps erroneously) called "free" ammonia, and exists chiefly as sulphides, carbonates, and thio-sulphate of ammonia; while the remainder, amounting in some cases to 20 per cent. of the total, consists chiefly of the chloride, sulphocyanate and sulphate of ammonia, and is usually described as "fixed" ammonia. To liberate this "fixed" ammonia, a large consumption of fuel is necessary; otherwise a very appreciable quantity of it is lost. In some cases, in consequence of the hitherto disproportionate cost of its recovery, as compared with that of the free ammonia, the whole of the fixed ammonia has been allowed to run to waste; and the object of these improvements is to enable the fixed ammonia to be economically and efficiently recovered by means of compact and simple apparatus.

The forms of apparatus hitherto employed and the methods of applying and distributing heat thereto are very numerous; but from a practical experience of 25 years on a large manufacturing scale, the patentee says he has found that many of the methods are more or less faulty, unsuitable, and irrational. He has used the column still constructed by Laming on the principle of the well-known "Coffey's alcohol still," and its subsequent modification for the distillation of ammonia patented by Newton. This column still, it is remarked, was designed with the view of expelling both free and fixed ammonia at one operation; and it consisted of a cylindrical upright column of equal diameter throughout, provided at regular intervals with diaphragms or plates placed horizontally, steam spaces at the top and bottom, and a central chamber into which lime was introduced. Over these plates, the liquor to be distilled was caused to flow, meeting in its downward course a current of steam. It was, however, found in practice that, whereas the free ammonia was readily expelled in the upper portion of the still, the fixed ammonia now decomposed by lime in the central chamber, was only partially liberated, notwithstanding that the plate-area was proportionately much in excess of that allotted to the free ammonia. This waste of ammonia led to the now well-known process of employing two separate column stills, in conjunction with lime mixers, agitators, exhausters, hot-liquor pumps, &c. Although by this somewhat complicated arrangement the whole of the fixed ammonia can be recovered, the extra cost of fuel is enormous, and the re-pumping of the hot liquor and periodical cleaning of the still rendered necessary by the accumulation of lime on the plates, is both inconvenient and expensive. This combined free and fixed ammonia still has been reproduced in various modified forms, in some cases with the addition of complications which are clearly undesirable—especially in the working of ammoniacal liquor not absolutely (as is seldom the case) deprived of all tarry matters.

It appears to have been forgotten, the patentee continues, that the same manner of applying heat which is successful in the case of the expulsion of free ammonia, is not so when fixed ammonia has to be dealt with. In the upper or free ammonia portion of a combined ammonia still—provided, of course, that proper precautions are taken to separate all tar—the places or diaphragms will keep clean for many years, and maintain their conducting power; the liquor being heated not only by the passage of steam over the surface, and by its actual

contact with the thin stream of the liquor passing over the lips of such plates or diaphragms, but also in a very large proportion by heat communicated to the liquor through the underside of the plates themselves. This, however, is not the case when the fixed ammonia is decomposed by lime; for, if this process is to be thoroughly effective, such liquor must contain a certain proportion of lime in mechanical suspension, which accumulates upon the plates, and forms a lime slush, continually increasing in density, and diminishing in conducting power. Thus there is considerable loss of heat; and, moreover, the lateral and slightly upward force of the steam retards, or pushes back, so to speak, this slush—forming an irregular surface, and causing the liquid to flow in uncertain streams, instead of in an even thin sheet. The most efficient and economical method of liberating the fixed ammonia is by means of free steam introduced into the distilling apparatus as dry as possible. It need not necessarily be superheated; but in the case of a lengthy supply-pipe, should be deprived of any water of condensation by a catch vessel, before entering the still. It must also be brought in direct and intimate contact by passing it through the ammoniacal liquor. The mere introduction, however, of free steam at random, or even equally distributed, and its application to variable quantities of liquor, will not produce the best results. To ensure this, it is necessary that free steam should be introduced into each of a series of chambers containing liquor of varying strength; and that the steam supply be so regulated in the chambers that it shall act with more energy, and be supplied in proportionately greater quantity as near as convenient to the point at which the spent liquor leaves the still; its supply being gradually reduced, as it acts successively on known and constant quantities of ammoniacal liquor of gradually increasing strength. Beyond the provision of a suitable still, simplicity should be studied in all other portions of the apparatus. It is necessary for the successful and economical treatment of ammoniacal liquor that before distillation, it should be entirely deprived of all tarry and foreign matter; the waste heat and products, from whatever source, of the operation should be utilized; and a due regard (so often neglected) should be paid to the avoidance of nuisance.

In order that the improvements, in the various portions of the apparatus, may be better understood, the inventor proceeds to describe the method of working them, in (as an example) the manufacture of sulphate of ammonia.



The overhead supply-tank E, heater, and tar separator G being charged with ammoniacal liquor, the condenser G^1 being charged with cold water, and the saturator J and interceptor K being charged with dilute sulphuric acid, the outlet or spent liquor tap N is closed, and steam is gradually admitted into the fixed ammonia still by the valve M. When the still and the pipe H connecting it with the saturator have become heated, the ammoniacal liquor tap R is gradually opened. The liquor will now flow upward through the heater, and deliver itself into the upper portion of the still by means of the pipe I connecting it with the heater; and the vapours here given off pass by the pipe H^1 into the top of the still, and from thence through the pipe H into the saturator. The liquor now flows downward; and in its descent over the plates or trays is deprived in great part of free ammonia. The steam and liquor supply should be so regulated that not a trace of either sulphuretted hydrogen or carbonic acid can be found by the usual tests in a sample taken from the trial cock affixed to the lowest plate M. The ammoniacal liquor, after passing the lowest plate, falls into the first cylinder or compartment No. 1 of the fixed ammonia still F^1; and is simply heated by the surrounding steam and liquor and the dry heat of the pipe passing through it. The object of this central chamber is to make it absolutely impossible for any tarry matter to pass into the lime chambers; early indication of tar entering it being given by the trial cock above mentioned. This chamber is provided with a manhole and outlet-pipe for the purpose of cleaning when necessary; but, with ordinary care, it should suffice to retain for years any accumulation of foreign matter likely to enter it from the plates above.

From this central chamber No. 1, the ammoniacal liquor overflows close to the lime-inlet pipe into the second chamber; and thence under the partition into the third. When the liquor in Nos. 2 and 3 has nearly attained the proper working level (at which height all overflows are placed), cream of lime previously passed through a fine sieve is forced into the second chamber in regular quantities—depending upon the amount of fixed ammonia contained—by means of an injector or other suitable contrivance. The liquor, now containing lime, overflows at the extreme end of No. 3; and from thence by an overflow-pipe into No. 5, and successively into the remaining chambers. From the last of these it is discharged through the spent-liquor pipe and tap N, which should now be opened, and so regulated that the liquor is maintained, as nearly as possible, at a given level, as ascertained by gauge glasses provided for the purpose. The outlet-pipe for the spent liquor N reaches within a short distance of the bottom of the still, in order that it may be constantly sealed, and so prevent the outlet of steam with the liquor. Nevertheless, even with this precaution, an occasional bubble of steam from the coil may find its way upwards. As a further precaution, therefore, this pipe is caused to dip into a short length of pipe of larger diameter, closed at the bottom, by which means the passage and loss of steam is entirely avoided.

This hot spent liquor, having been allowed to subside for a short time in a settling-tank, is utilized in the manner to be described. Having ascertained the distilling power of the still (though not pressing it to its extreme limit), it is preferred to set the steam-cock at a fixed point, leaving the necessary quantity of ammoniacal liquor to be supplied and regulated by the liquor-valve R, which should be provided with an index and graduated disc. The steam is applied in such a manner that its greatest energy and heat are brought into intimate contact, firstly with the nearly exhausted liquor of the chamber No. 8, and successively (in diminished quantity) with the liquor contained in the remainder of the lower series. The vapours from the four outer chambers passing by the outlets B into the upper or vapour space of the cylindrical chamber No. 4, and mingling with the vapours here given off, are conveyed into the upper coil of the chambers Nos. 2 and 3; and here a violent ebullition takes place, accompanied by a thorough and intimate mixture of the lime with the ammoniacal liquor.

From the chambers Nos. 2 and 3, the steam and ammoniacal vapours pass into the upper part of No. 1; and from thence in succession under and over the plates or trays in the free ammonia still, increasing in ammoniacal strength as they proceed until, arriving at the upper steam space, they are highly charged with ammonia and other gases. These mixed vapours are now conducted through a lead pipe H into the saturator J, where the ammonia is arrested by the sulphuric acid therein contained. This acid should be more or less diluted according to the strength of the ammoniacal liquor employed; but, under no circumstances should it be so strong as to admit of the crystallization of the sulphate in the saturator itself. The gravity of the acid solution most suitable to be employed can be readily ascertained by any intelligent workman; but, as a practical guide, the formation of a pellicle of salt on the surface of the sulphate solution, when slightly cooled, indicates the proper strength. The vapours from the saturator are now passed into a second lead vessel through the pipe P^1, which is called the interceptor K. This is similar in size and construction to the saturator; but is placed at a higher level, and connected with it in such a way that, when a fresh charge of acid is required, it must of necessity pass through the interceptor before entering the saturator. By this arrangement, the almost unavoidable loss of ammonia which would occur during the period of recharging the saturator, or the loss which would arise through the neglect of a workman in not testing the solution at a sufficiently early stage of the operation, is wholly prevented; and it is also a safeguard against the formation of carbonate of ammonia in the cooler part of the condenser, which is frequently a source of danger in some forms of apparatus.

The hot vapours are now passed through a 6-inch lead pipe P (with a slightly downward inclination towards the interceptor) into the 6-inch coils with which the heater G is provided. By this means the crude ammoniacal liquor as it flows gently upwards becomes heated by the descending hot vapours; and the minute globules of both light and heavy tarry matter that it holds in mechanical suspension, are completely separated, and respectively rising or falling are withdrawn, as occasion requires. Arriving at the lowest coil of the heater, though deprived almost entirely of their heat, the vapours are not sufficiently dry to ensure the perfect combustion of the sulphuretted hydrogen. They are, therefore, passed through the condenser G^1; and, passing by the pipe B, can be utilized for the manufacture of sulphuric acid or the recovery of sulphur; or, if desired, they may be sent through an ordinary dry purifier containing oxide of iron, rendered porous by some suitable material.

The foul water resulting from this condensation, highly charged with sulphuretted hydrogen and other deleterious gases, is run into the one or the other of the jacketted pan or pans provided with a coil or series of pipes H. That is, supposing the one pan to be about two-thirds filled, the liquid is diverted, by opening a cock, into the other pan, and the cock is closed by which the first pan was supplied. Nearly boiling spent liquor from the settling-tank is caused to flow through the pipe A under and around the partially-filled pan, or through the coil or series of pipes; the overflow F being always open. The heat of this in great part drives off the highly volatile and noxious gases; but should it be found that the heat imparted by the spent liquor is insufficient in itself to expel the whole of the gases, free steam is admitted through a steam coil, as an auxiliary, until, by the usual tests, not a trace of sulphuretted hydrogen or cyanogen can be detected in the steam evolved. When this is attained, the now purified water is run off, and the process repeated in alternate pans. The vapours given off in this operation may be conveyed by the pipes P P^1 into the heater, or they may be treated for the recovery of cyanogen by the process described in patent No. 1274 of 1873.

When the time for the complete neutralization of the sulphuric acid in the saturator is near approaching—which to an experienced workman is known from the smell emitted by a small test-pipe connected with the saturator, or which can be ascertained with sufficient accuracy by a simple calculation (the strength and quantity of both ammoniacal liquor and acid employed being known)—it is necessary to watch the process until the solution of sulphate of ammonia has become slightly supersaturated with ammonia, or until any iron with which it may be contaminated is separated. The sulphate solution is now to be run, by means of an air-tight communication—provided with a suitable valve-tap or other appliance for opening or closing it—into the steam-tight receiver I, through which the hot spent liquor is caused to circulate, either direct from the settling-tank before mentioned, or after having passed the foul-water pans. This hot liquor is allowed to flow through the coil H^1; and is, if necessary, supplemented by free steam through a separate coil, until not a trace of ammonia, sulphuretted hydrogen, or other noxious gases can be discovered by the ordinary tests. The

vapours evolved in the vessels are now conveyed through a lead pipe, dipping slightly into the acid solution contained in the interceptor. Here the ammonia is retained, which, without this operation, would escape in the process of evaporation, together with sulphuretted hydrogen and other noxious vapours. Having ensured the complete expulsion of all gases, the free steam is shut off (supposing it to have been employed) from the vessel or vessels containing the sulphate solution; but it is arranged to still allow such quantities of hot liquor to flow through as will maintain it in as concentrated a state as possible without causing so much evaporation or circulation of the liquor to occur as would in one case precipitate the sulphate in the form of crystals, and in the other prevent the due subsidence of the precipitate.

By this means the cost of future evaporation is materially lessened. The hot sulphate solution having being allowed sufficient time to repose, and in the absence of a vacuum-valve, the plug of the air-pipe being withdrawn, the clear liquor can be run off, and treated in the usual manner for the manufacture of sulphate of ammonia. The dark precipitate which after a time accumulates in the receiver, consisting chiefly of the sulphides of iron and arsenic, should be periodically removed to a separate vessel, where, having been washed to remove any sulphate of ammonia that it may contain, it can be used or thrown away as desired. The liquor from such washings can be profitably used to dilute the sulphuric acid.

The spent liquor, having been deprived by the preceding process of a great portion of its heat, may be treated for the recovery of the cyanogen substances by the process described in patent No. 1285, of 1873.

By employing the present method of treatment, the resulting sulphate of ammonia, even though made from cheap pyrites acid, is said to be greatly superior in quality to that usually produced, and to contain much less free sulphuric acid; the cost of fuel is considerably reduced; and all nuisances in the manufacture are absolutely avoided. The portion of the apparatus consisting of the compound ammonia still, heater and tar separator, and condenser, can also be used economically and with advantage for the simple distillation of ammoniacal liquor, in order to produce a strong solution of liquor ammonia for the subsequent manufacture of other salts of ammonia.

Inlet Regulator for Gas and Water Meters.—Slatter, W., of Wandsworth Road, S.W., and Watkins, W. J., of Wood Green. No. 17,713; Nov. 7, 1889. [8d.]

This invention relates to regulators of the Carnaby type—*i.e.*, those so constructed that, by turning a key or handle, the main inlet cock or tap can be more or less opened and the inlet to the meter so controlled. These regulators may, however, be improperly used, by inadvertence or extravagance, so that when only a small quantity of gas or water is necessary, they are turned full on; and so mar the use for which the apparatus is intended. According to the present invention, such regulators are rendered incapable of this failing by making them adjustable, so that they can be set to permit of only such a quantity of gas or water entering the meter as may be required. This is done by providing the main-wheel of the ordinary regulator with a stud or projection of sufficient length to enter a segmental slot formed in a "stop-wheel." This wheel is mounted on the same axis as the main wheel, but turns independently of it by means of a pinion gearing with it. The spindle carrying this pinion is turned by a notched head or wheel, whose notches or interstices engage with one extremity of a pivotted lever or arm controlled by a spring. By opening the hinged cover or door—provided with a lock and key—the pivotted lever or arm may be disengaged from the notched head or wheel on the spindle of the pinion, which may then be turned so as to adjust the stop-wheel to any desired position, and thus limit the movement of the main-wheel actuating the inlet cock or tap. The main-wheel and stop-wheel are each provided with an index finger travelling over a dial; so that the movements and positions of the wheels are clearly indicated. It is thus possible for such regulators to be adjusted so that the main cock or tap admitting the gas or water can only be opened to an extent depending upon the position of the stop-wheel; and this can be determined by the owner of the key of the covering door.

Gas Motors.—Duerr, F., of Munich. No. 20,161; Dec. 14, 1889. [8d.]

This invention relating to gas motors, has for its object: (1) To provide a contrivance for automatically regulating the various momentums in four-time motors, in the shape of a disc, secured to the main shaft and fitted with suitable heels or cams, which are transposed relatively to each other as required, so as to regulate the different movements by acting through levers on the various mechanisms. (2) To regulate the admission of gas to the explosion chamber by means of a lever pendulum, actuated by the disc and connected with the inlet-valve. When the motor works too rapidly, the heel of the disc throws the lever further off than when the motor is working at normal speed, and thus keeps the inlet-valve closed for a proportionately longer period, so as to permit an admission of gas only at longer intervals. To allow its movement to be regulated, the pendulum lever is provided at its free extremity with an adjustable poise in the shape of a disc. (3) To provide (in certain constructions of the engine) an improved petroleum evaporator, forming the double mantle of a cylindric heating chamber.

APPLICATIONS FOR LETTERS PATENT.

9921.—Herrmann, R., "Igniting-valve for gas-engines." June 26.

9924.—Bradley, H. W., "Means for facilitating the starting of gas-engines." June 26.

9993.—Ballard, T. W., and Howard, J. B., "An incandescent asbestos gas-fire." June 27.

10,069.—Robinson, H., "Improvements in gas or combustible-vapour engines." June 30.

10,089.—Beechey, C. G., "Improvements in gas motor engines." June 30.

10,138.—Harrison, S., and Sheard, J. T., "A self-locking arrangement for gas and other cocks." July 1.

10,155.—Ruscoe, J., "Improvements in means or appliances for facilitating the operations of charging and drawing the charges of certain gas-retorts." July 1.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

Mr. West and the Assistant-Secretary of the Gas Workers' Union

Sir,—The Assistant-Secretary of the Gas Workers' Union has again "coined out of his imagination" gross and unwarrantable statements, which I feel bound to refute.

First, he states that he could mention one man who was seventeen years a servant of the Corporation, who was discharged through my instrumentality. I most emphatically state that he could do nothing of the kind; for no such man was discharged at my instigation.

Secondly, he asks if I deny reducing the yardmen's wages at the Rochdale Road works from £1 to 18s. per week, and made the men come on at six o'clock on Monday morning, when their time previously had been seven o'clock. He also goes on to say that he saw Mr. Adam Woodward, the Chairman, and asked him if he knew that the men were receiving 2s per week less at the Rochdale Road works than at the other stations, and states that the Chairman, to his honour, rectified the matter. I emphatically deny that the labourers' or any other men's wages were reduced at the Rochdale Road works during the time I was acting for the Corporation; but, on the contrary, I caused some of them to be increased. To show you how far this man's statements are wide of the mark, I beg to inform you that Mr. Adam Woodward, the Chairman referred to, died before I was appointed Chief Engineer to the Corporation. There was an alteration made in the workmen's hours for commencing work at all the stations. I found that the mechanics, bricksetters, and labourers commenced and left off work at different hours, with the result that sometimes the mechanics were without labourers, and *vice versâ*. The mechanics made 54½ hours per week; and the labourers, 58½ hours. I arranged that they should all commence and finish at the same time, and all make 56½ hours per week. The mechanics were paid time-and-a-quarter for the extra two hours, and the labourers were paid the same money for the 56½ hours as they had received formerly for 58½ hours.

You will remember that Mr. Ward, in a former letter, tried to make out that the Gas Workers' Union were not in any way responsible for the recent deplorable strike of the stokers against working with non-Union men in Manchester; but I find that there is not the least doubt that the officials in London knew what was going on, from the fact that one of the printed documents sent in to the Gas Committee is headed as follows: "National Union of Gas Workers and General Labourers of Great Britain and Ireland. Registered Office—144, Barking Road."

These officials of the Union undoubtedly only repudiated responsibility and ran away when the strike proved a failure.

Manchester, July 12, 1890. John West.

The Automatic Coal-Gas Retort Company, Limited

Sir,—I have perused with much interest the report in this week's Journal of Mr. Van Vestraut's paper on automatic retort charging and discharging, read during the proceedings of The Gas Institute at Ryde. I also note your editorial remarks on the same subject, and the paragraph referring to the advertisement of the Automatic Coal-Gas Retort Company, Limited, with explanatory details as to the price which is to be paid to the patentees for their invention, and the reports which have been issued in support of it by well-known Gas Engineers.

For many years I have interested myself in the question of the automatic charging and discharging of gas-retorts; and in 1873 I took out a patent (specification No. 2954) dealing, as I then thought, with the essentials of such working. This patent was not renewed; and my invention, whatever it may be worth, is open to the public at the present time.

I now write as one of the public, in no spirit of captious envy that others should have succeeded where I had failed, but simply because of the interest I have taken in the subject, and the expense I have incurred, and also, to some extent, because there is a disposition to look favourably on the principle by a Gas Company I am connected with. This Company may shortly be in a position to adopt a setting of the kind, and they will naturally desire to know what royalty they will have to pay in the matter, and why such royalty may be demanded.

My patent is based on a repose coal angle in the retort of not less than 30° from the vertical. The coal is passed from overhead trucks through hoppers into the retorts; and the action is either intermittent or continuous, by hand power or by machinery. My patent deals besides with other matters, somewhat beyond the mere carbonization of coal, which have also recently come prominently to the front. But in the especial points referred to, it certainly seems to cover much of the ground which I understand is now claimed by Messrs. Van Vestraut, Morris, and Coze.

I see from your paragraph that, out of a capital of £250,000, the Automatic Company are to pay £200,000 to the patentees; £140,000 being in cash, and £60,000 in fully-paid shares. This leaves only £50,000 available to earn a dividend; and I naturally deduce from this that very heavy royalties or profits will be demanded on the work done by this comparatively small amount, in order to divide a sum among the shareholders which will classify the property as a successful undertaking. Not being interested as a shareholder, I have nothing whatever to do with the amount which is assumed to be a fair reward to the patentees; neither have I at this moment any desire to impugn the validity of the patents, for which this amount has been, or is to be paid. I assume, on the contrary, from the highly respectable names by which the undertaking is supported, that in several indispensable and essential points the patents are valid; and that it is believed that the results obtained can only be got in the way they specify.

My difficulty, however, is to know—and I think the public have a right to know—what these special points are. The principle of angled retorts cannot be one of them; because angled retorts date from the earliest days of gas lighting. Neither can the angle of coal repose, of 30° and above be included. Nor can the filling of the retort from a hopper. There remains the charging by a scoop—as I understand is

done in the Coze system. But if the angled setting is open, as undoubtedly it is, surely the use of a scoop in such a setting as now practised with horizontal retorts cannot be prevented.

These points, however, refer to general principles. No doubt the setting as a whole must be considered; and there may be details of construction without which the whole would be unworkable. The setting may be, and probably is, an exceedingly good one; and the details for such a setting may be essential. But if the claims of the patentees rest simply on their setting as a whole, and upon its details of construction, may not principles which are open be reverted to? and may not variations of design and working be introduced uncovered by the present patents, and which will give as good results as are now obtained? If this is so, the price to be paid by the Automatic Company seems a high one, as two or three besides myself will think twice, or even thrice, before agreeing to royalty which such a price seems to indicate; whereas, on the other hand, if the royalties were moderate, few would be disposed to risk the trouble and expense of finding other roads to the same goal besides the one which had already been tried, and upon which they could depend.

Before finishing, I may confess that I think it is fair that, as far as possible, those who have contributed to bring the idea to its present form should have their work recorded. I do not assume that my part has been important; and, from the time which has elapsed, I am not surprised that, like many more deserving efforts of others, it has been forgotten. Whoever has the credit of making it a success, I shall be glad that progress in the system has been realized. Still the "*£ s. d.*" portion of the question is important when royalties come to be paid; and I think most owners of gas property, as well as managers, will join with me in hoping that you will help to elucidate the question I have raised.

A. F. WILSON.

July 12, 1890.

Wind Pressure on Gasholders.

SIR,—I am not concerned in the construction of gasholders; but wind pressure exerted upon any structure is a subject of interest to an engineer. Surely Mr. Gadd must be wrong in the figures in his paper when arriving at the nature of the wind pressure on the Northwich gasholder.

G. D. HARRISON.

Staffordshire Potteries Water-Works Company, Hanley, July 9, 1890.

"Steam" Washers.

SIR,—We are very much surprised at Mr. Greenall's extraordinary attack on us in your last issue. We never heard of "severe trials" by the Sanitary Institute "extending over two days," nor do we see any reason for a two-days' trial for what can be tested in half-an-hour or less. It would appear as if Mr. Greenall is drawing on his imagination for this, as he is for his other statement relative to the awards given by the Sanitary Institute of Great Britain at Leicester in 1885. Instead of not being even mentioned, as he asserts, we received the Institute "certificate of merit for washing-machines heated by gas," together with the silver medal of the Leicester Corporation and two bronze medals of the Institute for other appliances—a rather different state of matters to what Mr. Greenall endeavours to convey.

THOS. FLETCHER AND CO.

Warrington, July 11, 1890.

Boston Gas Company.—The balance-sheet presented at the annual meeting of this Company last Thursday showed that the profit on the revenue account during the year had been £3466. In February an interim dividend was paid at the rate of 4½ per cent. and 3½ per cent. respectively on the old and new shares; and the Directors recommended the payment of the full dividend on both classes of shares. In June a further sum of £1000 was added to the reserve fund; making £2000 now invested. There was a decrease in the profits, which was accounted for by the reduction of 2d. per 1000 cubic feet in the price of gas, and an increase of 1s. 8d. per ton in the cost of coal. The report was adopted.

The Cost of Investigating Gas Companies' Accounts.—Last Friday week, at the Kent Quarter Sessions, Mr. B. Morice, addressing the Recorder, said that the matter between the Gravesend Gas Company and the Corporation (concerning which he made an application in January last on behalf of Messrs. A. Tolhurst and T. Layborn, for the appointment of an accountant to make an investigation of the Company's books) having been settled, he now had to ask that the order previously made should be discharged. Under the Gas-Works Clauses Acts, it was necessary for the Recorder to fix the remuneration of the accountant; and he suggested that fifty guineas would meet the requirements of the case. Then there were other costs in the matter which his Honour had power to deal with; and he (Mr. Morice) had to ask that these costs should be included in the order, to be paid by the Gas Company, but to be taxed out of Sessions, feeling that such a course would meet the convenience of both parties, and be quite in accordance with the order the Recorder had the power to make. The petitioners in the matter had been acting, not only for themselves, but on behalf of the ratepayers and gas consumers in Gravesend. Mr. G. B. Rosher, for the Gas Company, said he was quite willing to consent to the order being discharged; but on the question of costs, he submitted that the only costs the learned Recorder had power, under the 35th section of the Act, to order the Gas Company to pay, were the costs of the accountant's investigation, which had already been ordered. The Recorder said it was a proceeding for the benefit of the ratepayers; and the Act never intended that the expense of investigating the accounts of the gas undertakers should be borne by the ratepayers. A petition having to be presented in a Court of Quarter Sessions, which must be addressed by counsel, the petitioners could not apply in person. He, therefore, held that the necessary application to the Court, and the attendances of counsel there, were part of the expense of obtaining the appointment of an accountant or person to investigate the accounts of the Company, and that the Company were liable. The Recorder then made the order for costs, as asked for by Mr. Morice, but said that he would state a case if the Company wished to contest his decision. Mr. Rosher said they were quite ready to accept the decision.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

During the past week the following progress was made:—

Bills read the first time: Electric Light Provisional Orders Bills (Nos. 1 to 9); Electric Lighting Provisional Orders Bill (No. 14), comprising Orders relating to Aberdeen, Dundee, Kelvinside, Moss Side, and Stretford; Liverpool Corporation Bill; Metropolis Management and Building Acts Amendment Bill.

Bill read a second time and committed: Airdrie and Coatbridge Water Bill.

Bill reported: Glasgow Corporation Bill.

Bills read the third time and passed: Wallasey Local Board Bill; Walsall Corporation Bill.

A petition was presented against the Airdrie and Coatbridge Water Bill, from the County Council of Linlithgow, the Police Commissioners of Bathgate and Armadale, and the owners, &c., of lands, &c., on the Forest Burn, the Rivers Avon and Almond, and their tributaries.

HOUSE OF COMMONS.

Tuesday, July 8.

THE LONDON COUNTY COUNCIL AND THE CONSERVANCY OF THE THAMES AND LEA.

On the consideration of the amendments to the London County Council Bill,

Mr. LAFONE moved to omit from the preamble the following words: "And whereas the Council has no power of appointing any Conservators of the River Thames, and having regard to the extent of that river within the county of London, it is expedient that the Council should be empowered to do so." He said the proposal was that the Council should be empowered to appoint five members of the Thames Conservancy Board; but he strongly objected to this, on the ground that it would make the Board more unwieldy and unworkable than it was at present.

Mr. STORY-MASKELYNE, in seconding the amendment, pointed out that they could not add the five members proposed without acceding to the demand of other County Councils along the course of the Thames to be represented on the Board.

Sir J. LUBBOCK said the last speaker had expressed the opinion that every Local Authority along the Thames ought to be represented on the Thames Conservancy Board, and yet he supported the amendment, which would deprive the greatest Municipality along the river of any such representation. The clauses of the Bill had been fully discussed before the Committee. The river passed for 23 miles through the county of London. The County Council had grave responsibilities in regard to floods; and surely, therefore, they ought to be represented on the Board. If the amendment was carried, the representatives of London would have no voice whatever in the control and management of their own river.

Mr. MURDOCH remarked that the Bill was entitled "A Bill for the improvement and alteration of the bridge over Bow Creek and Barking, and the acquisition and management of Brockwell Park." When an attempt was made by the London County Council, under the guise of a Bill for these purposes, to appoint five members of the Thames Conservancy Board, he thought most honourable gentlemen must feel that they had been taken by surprise, and that their attention had not been properly directed to the contents of the measure. Parliament had always resisted the endeavour of the Metropolitan Board of Works to have members placed on the Thames Conservancy Board; and he therefore trusted that the House would re-affirm the decision it had given over and over again, that it would be against the interests of the Thames Conservancy that members representing either the County Council or any body of that description should be placed on the Board.

Mr. LAWSON contended that the principle of representation on the Board had been already admitted; for the City of London had seven members upon it. This was no case of special grievance against the Board by the County Council; it was simply a claim by them for just representation in reference to matters which very closely affected the people of the Metropolis.

Mr. DIXON-HARTLAND observed that this was really a sewage question; and if the powers sought by the County Council were granted, he feared the mouth of the Thames would become a vast sewer.

Sir C. RUSSELL remarked that, in all the arguments addressed by the opponents of the Bill, they seemed to regard the question as if the interests of the London County Council were opposed to the general interests. The County Council was the largest body concerned in the question directly elected by the people; and it had the control over a large area on each side of the river. Yet at that moment it had no representation on the Conservancy Board, while the City of London had seven representatives. The claim to have five representatives was moderate, and only fair. With regard to the River Lea, the case was, in his judgment, still stronger. He knew nothing more disgraceful than the history of the pollution of the River Lea; and if there had been control over the river by any representative body directly interested in the purity of the river, it would not have been reduced to the shocking condition in which it had been of late years in its lower reaches. He submitted, therefore, that the claim of the County Council was a just and proper one.

Sir M. HICKS-BEACH said he had no fault to find with the Thames Conservancy as at present constituted, but quite admitted that there might be a very fair argument made out for more direct representation than the inhabitants of London had at present. Still, the proposed number of 16 Metropolitan members out of a total of 28 was a proportion that was not fair to the inhabitants on the Upper Thames. The wisest course would be for the House to decline to adopt the proposals relating to this matter, and next year to appoint a Select Committee to consider the whole question of the Conservancy of the Thames; and, if it was decided to make a change, to give representation to all the riparian interests.

Sir J. BAILEY, as Chairman of the Committee which had considered

the Bill, replied to the various statements made in the course of the discussion. He said that in 1888 the conservancy of rivers was given to County Councils; and it appeared absurd that the great Municipality of London should be the only one not having the control over its own river. The Metropolitan Board of Works, and their successors the London County Council, had done an enormous amount of work in the valley of the Thames. Most of the drinking water of London was derived from the Thames and the Lea; and surely the body which had the right to look after the health of the Metropolis should be represented on the Thames Conservancy. They already had exclusive jurisdiction over 21½ miles of the river. He did not think a Committee could have come to any other conclusion than that a body having this enormous authority over the banks of the river was entitled to some share in the management of that river.

Mr. RITCHIE said he thought the course suggested by his right honourable friend (Sir M. Hicks-Beach) was right and proper; and if other County Councils sought representation on the Conservancy Board, their claims could be fully considered. He deprecated the London County Council's proceeding with the matter now, looking to the fact that, by their own admission, it was one that ought to be carefully considered by a Select Committee, with a view of settling the various interests.

Sir W. HARCOURT said the Chairman of the Committee had given the reasons for the decision arrived at; and he had not heard any arguments from the other side of the House which should induce them to upset that decision. The acceptance of the representation of London proposed by the Bill did not exclude the representation hereafter of other County Councils on the Conservancy Board. London had the first interest in the Thames; and however just other claims might be, those of London ought not to be postponed on their account.

After some further discussion, the amendment was carried by 191 votes to 164.

Mr. WEBSTER then moved to omit from the preamble of the Bill the words relating to the River Lea. He said he quite acknowledged that the state of that river was, and had been for some years, very unsatisfactory; but he did not think purification could be effected by adding another representative of the London County Council to the Lea Conservancy Board.

Sir J. LUBBOCK said the Government had decided that for the present the representatives of London should have no voice in the management of the Thames. If they were going to take the same course in regard to the Lea, it would probably be useless to go to a division. He wished to know, therefore, whether the Government proposed to include the Lea in their inquiry. He assumed that they would not do so; and he hoped, therefore, that they would support the Bill and the Committee of the House with respect to the present amendment.

Mr. RITCHIE said he had informed the right honourable baronet that the portion of the Bill affecting the Thames Conservancy would be opposed. The Lea, however, stood in a different position. Something had been said about the water supply of London. If there was one river more than another that the people of London were concerned in in this respect, it was the River Lea. The Council had already a representation of one on the Lea Conservancy Board; and looking to the fact that the Committee had said that this ought to be increased to two, he should certainly support the recommendation.

Sir W. HARCOURT said the Government were treating with contempt the Committee which considered the Bill, and which approved of the representation of the London County Council on the Thames Conservancy. Why should this matter be postponed for another year? The President of the Local Government Board (Mr. Ritchie) admitted that the County Council ought to be represented on the Lea Conservancy Board, because the London water supply was connected with that river. But a great part of the water was taken from the Thames above Kingston; and so the argument, the force of which the right honourable gentleman admitted with regard to the Lea, also applied to the Thames.

Sir M. HICKS-BEACH remarked that the whole subject could be dealt with next session; and when it was considered, he certainly should not oppose the due representation of the London County Council on the Thames Conservancy Board. As to the River Lea, he agreed that this question stood upon a different basis; and he hoped his honourable friend would withdraw his amendment.

The amendment was then withdrawn; and, after some further discussion, the Bill was ordered for third reading.

Thursday, July 10.

WATER COMPANIES' CHARGES BILL.

The Examiners reported non-compliance with Standing Orders in the case of this Bill; and their report was referred to the Standing Orders Committee. The second reading of the Bill, fixed for to-day, was therefore deferred till the 17th inst.

During the past week the following progress was made:—

Bills read a second time and committed:—Electric Lighting Provisional Orders Bills (Nos. 10, 11, and 13).

Bills reported: Electric Lighting Provisional Orders Bills (Nos. 1 to 5 and 7 to 9); Gas Orders Confirmation Bill (No. 2); Liverpool Corporation Bill; Oxford Corporation Bill; Water Orders Confirmation Bills (Nos. 1 and 2).

Bills read the third time and passed: Belfast Corporation Bill; Electric Lighting Provisional Orders Bills (No. 1 to 9); Gas Orders Confirmation Bill (No. 2); Liverpool Corporation Bill; London County Council Bill; Metropolis Management and Buildings Acts Amendment Bill; Newcastle and Gateshead Water Bill; Stockton and Middlesbrough Water Bill; Water Orders Confirmation Bills (No. 1 and 2).

Bill withdrawn: Aberdeen Electric Lighting Bill.

A petition against the Coatbridge Electric Lighting Order, contained in the Electric Lighting Provisional Orders (No. 10) Bill, was presented from the Coatbridge Gas Company.

The Electric Lighting Provisional Orders Bills, Nos. 10 to 12 (containing the Chatham and Rochester District, Coatbridge, Crystal Palace District, and Paddington Orders opposed), and the Warrington Extension, Water, &c., Bill, were referred to a Select Committee, consisting of Mr. Mount (Chairman), Mr. Joicey, Mr. Heath, and Mr. Maguire; to meet on Tuesday, July 15.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

Saturday, July 12.

(*Before Mr. Justice* KAY).

The Incandescent Gas-Light Company, Limited.

This was a petition asking for the reduction of the capital of the above-named Company, which was incorporated on Feb. 14, 1887, for the purpose of working the patents of Dr. Carl Auer Von Welsbach in connection with incandescent gas-burners. The nominal capital was £500,000, divided into 100,000 shares of £5 each. Of the total number, 47,103 shares were issued; but this was reduced to 39,755 by reason of some being forfeited and others surrendered by the vendor. It was now asked to reduce the capital to £41,000, divided into 40,000 ordinary shares of £1 each, and 10,000 preference shares of 2s. each.

Mr. RENSHAW, Q.C. (with him Mr. FARWELL) appeared in support of the petition, and read an affidavit made by Sir Edward Inglefield, the Chairman of the Company, in which he said that capital to the extent of £158,000 had been lost, or was unrepresented by any available assets. Of this amount, about £29,000 had been lost in trading; the rest being represented by the amount of the depreciation in value of the patents. At the time of the purchase of the patents, it was thought that the Welsbach would supersede all other systems of gas lighting; but this anticipation had not been borne out by the results. He (the Chairman) thought that, with careful management, the Company might in the future be able to pay a dividend on the capital proposed to be retained.

His LORDSHIP made the order, and directed the continuance of the use of the words "and reduced" for two months.

COURT OF SESSION—LANDS VALUATION APPEAL COURT.

Wednesday, July 9.

(*Before Lords* TRAYNER *and* WELLWOOD.)

The Assessment of the Kirkwall Gas-Works.

Probably the last case in which the principle adopted in valuing gas undertakings will be argued, unless the existing law should be altered, was disposed of by their Lordships to-day. The facts are as follows: The Kirkwall Gas Company appealed against the Magistrates of the burgh adopting the valuation of the Burgh Assessor for the year ending at Whitsunday, 1890, and fixing the valuation of the Company's undertaking at £140. They claimed that, on account of heavy outlay during the past year on renewals and repairs, the valuation should have been £55. Their average free income for several years, they said, had only been £110, which was at the rate of 5 per cent. on the capital; and the dividend paid was at the same rate. The Assessor based his valuation on the average revenue of the Company for the five years previous to the one in dispute. But during the year the Company had spent a considerable sum of money upon the renewal of deteriorated plant; and they argued that had this been taken into account by the Assessor, the valuation would have been reduced to the figure mentioned by them. The Company maintained that the principle of ascertaining the annual value from a comparison of the income and expenditure was an erroneous one. The letting value of the subjects for any other purpose than that of the Company would be much less than £100. Even assuming the principle to be right, calculation of the valuation from the average free income for five years would not, they submitted, show the real value of the undertaking at present. For the Assessor it was stated that he took the average outlay upon repairs for five years, which he found to be £102 3s. 7d., and deducted it, and then allowed 20 per cent. for tenants' profits. This left a balance of £178 11s. 8d., which he considered he might have entered in the valuation roll; but in order to guard against any possible overcharge, he had only entered £140, which would be at the rate of 7½ per cent. on the capital expended upon the works (£2200), less 15 per cent. for tenants' profits. He drew attention to the fact that an extraordinary expenditure on the plant must necessarily enhance the letting value of the undertaking, and that even although the works were standing idle, and not producing a cubic foot of gas, they would still be liable to be valued upon a percentage of the capital expended upon their construction. The matter came before their Lordships at the end of March last, when, finding the information before them insufficient, they sent the case back to the Magistrates to state the amount expended during the year on repairs and renewals. Their report was that the cost of renewals was £458 10s. 1d.; of repairs, £6 19s. 2½d.

On this report being submitted, Counsel for the Company argued that a hardship would be done to them if the valuation were left at £140; and he maintained that the view they took was right.

Lord TRAYNER said he had no difficulty whatever in arriving at a clear conclusion. He thought the principle adopted by the Assessor was a right one. The suggestion of the appellants, that he should have taken the cost of the works, and ascertained by a percentage upon that the amount of their value, seemed to him to be an erroneous method of reaching what was the annual value of any subject. He agreed with the late Lord Fraser that the proper way to arrive at the correct value was to take the income and expenditure, and then, allowing the tenant some proper charges, to get at the true value, or the amount a tenant would be likely to give for the use of the works. The expenditure admitted to have been made by the appellants was about £1212; but from this there must come off £458, which left the net expenditure at £753. The income was £1072; and if he deducted this from the £753, there remained £318 of free income. But he deducted from that an average allowance for repairs—£102; and he then took off 20 per cent. for tenant's profits. The result he found to be £174—not £178 as the Assessor did. This sum might have been entered as the valuation; but the Assessor had only entered £140. He would like to guard against the view that the Assessor had his approval in doing this or that. A percentage of capital was in any way to be taken in fixing the value; but looking to the

state of the case, he was of opinion that the judgment of the Magistrates was right.

Lord WELLWOOD concurring, the valuation was fixed at £140.

LAMBETH POLICE COURT—Wednesday, July 9.

(*Before Mr.* R. J. BIRON, Q.C.)

The Assault on a Beckton Non-Unionist Stoker.

It will be remembered that during the recent disturbances at Beckton in connection with the introduction of stoking machinery in No. 12 retort-house, one of the non-unionists engaged by Mr. J. West (John M'Mahon) was charged with assaulting at Vauxhall Cross, Patrick Corridon, a unionist stoker, and with attacking him with a long-bladed knife. But an investigation into the case by Mr. Biron put a different complexion on the matter, and resulted in the accused becoming the prosecutor, and *vice versâ*. The case again came before Mr. Biron last Wednesday, when Corridon appeared in Court with two black eyes and cuts about his head, which it transpired had been produced in another quarrel within the past few days. M'Mahon's story was to the effect that on Saturday, May 31, he went to Vauxhall Cross for the purpose of meeting his brother-in-law; and while standing there, he was surrounded by a number of men, one of whom knocked him into the gutter, the others kicked him, and he was compelled to draw a knife in self-defence. The prisoner, who was a unionist, was one of those who attacked him. A great deal of evidence was given; among the witnesses being Mr. West, who spoke of the manner in which his men had been treated by the unionists at Beckton, and of the steps which had had to be taken to protect them from assaults of this kind. The police constable who apprehended M'Mahon in the first instance, stated that he took him into custody because he saw a knife in his hand.

Mr. HUMPHRYS appeared for The Gaslight and Coke Company to prosecute; Mr. ARMSTRONG, instructed by the Gas Workers' Union, defended.

Mr. BIRON said he had no doubt that this was a premeditated affair, and that those who assailed M'Mahon knew of the appointment with his brother-in-law, who was employed at the Vauxhall Gas-Works. It was a most deplorable state of things that labouring men willing to work should be dictated to by force, and molested in the way described. Every man had a perfect right to sell his labour where he liked. With regard to Unions, men were perfectly free to belong to them; but members of such Unions must be kept within the bounds of the law. There was no doubt that the complainant possessed a very formidable knife, but he (Mr. Biron) believed that, if he had not carried the weapon, he would have been severely dealt with by those who attacked him. He could not deal with the assault as an ordinary one; and would sentence Corridon to one month's hard labour.

Mr. ARMSTRONG gave notice of appeal.

Mr. BIRON said two sureties in £50 would be required, with the usual notice.

The summons against M'Mahon was dismissed.

DUNEDIN (NEW ZEALAND) ASSESSMENT COURT.

(*Before Mr.* E. H. CAREW, *Resident Magistrate.*)

The Assessment of the Dunedin Corporation Gas-Works.

The above-named Court has lately been occupied in hearing an objection raised by the Dunedin Corporation to the amount at which their gas-works at South Dunedin had been valued for assessment purposes—viz., £3000.

Mr. J. R. SIMPSON and Mr. CHAPMAN appeared for the Corporation; Sir R. STOUT and Mr. SIM for the South Dunedin Council.

The TOWN CLERK (Mr. A. G. Price), who is the Valuer for South Dunedin, opened the proceedings by explaining the principle on which he had arrived at his total. He saw the City Council had issued debentures to the amount of £100,000 on their gas-works, and the profits in one year came to £3397. They estimated their works and plant to be worth in that year £96,000. The next year they estimated it at £96,000 with 2½ per cent. taken off for depreciation. Personally, he thought the works improved in value every year. Considerable improvements had been made since they were purchased for £48,000. If his valuation was too high, he could not understand what the Council were doing in floating debentures to the amount of £100,000. The valuation for the works in 1876-7 was £2200; in 1877-8, £2446; in 1878-9, £2560; in 1880-81, £2300; in 1881-2, £2500; in 1882-3, £2500; and in 1883-4, the valuation was £3300. This was the year in which the retort-house was completed. The valuation had been £3000 since. In 1886-7 an appeal was made; but the Corporation did not appear in time, and their objection was struck out.

Mr. SINCLAIR said the matter as presented by the Corporation was this: It was quite clear that the valuation was made on the profits of the total works. This, he submitted, was obviously an erroneous basis, for the simple reason that the gas-works were not all in the South Dunedin borough. Despite this fact, Mr. Price had assessed the total value of the works as a going concern. The bulk of the profit was not made in South Dunedin, but in the city. As a matter of fact, of the 2300 consumers, only 64 were in South Dunedin; and not only was this the case, but the large burners, from which the main source of profit came, were in the city. This being so, the basis on which the valuation had been made was utterly useless. He submitted that all the South Dunedin Corporation could rate was the portion of the property lying within the limits of the borough. He invited the Court, in making a valuation, to take simply the value of the land, the buildings, and the plant in South Dunedin.

His WORSHIP said he thought the value of the whole of the works as a going concern should be taken, and then the portion lying in South Dunedin separated.

Sir R. STOUT said his clients would not object to that. The test was this: What would the gas-works let for?

Mr. *J. B. Thomson*, a builder and contractor, then gave particulars of his valuation of the property. He said he put the land down at £150 an acre, and there were eight acres of it enclosed. He valued the buildings at £5069, the plant at £23,000, and the fences at £100. The mains had been valued separately by measurement. There were 4455 yards; and he had averaged them at 5s. per yard, which gave £1113 15s. The valuation for pipes did not include meters, which were supplied by the department. In round numbers, he put the pipes and meters at £1250. His total valuation—including land, buildings, and plant—was £29,500. There was an offer some years ago by a Syndicate to lease the gas-works; but it was not entertained. He supported the retention of the works, believing they would show a good profit. Had they been leased, it was very likely the Corporation would have been landed in an expenditure of £35,000 or £40,000, because gas-works required to be continually repaired, or they would be liable to run down. He was afraid the Syndicate would not maintain the property. The Corporation declined an offer to lease the works for £8000 a year, with a promise to reduce the price of gas.

Mr. *J. Reid*, who had made a joint valuation with the previous witness, supported his evidence.

Mr. *D. A. Graham*, Gas Engineer of the Corporation, was next called. He said that, assuming the valuation of the land by the last two witnesses to be correct, he put the worth of the mains and everything in the South Dunedin borough at £30,000. He had no hesitation in saying that the plant could be replaced for £30,000. In arriving at his conclusions, he had taken the English price, and added 25 per cent. The gasholder was in a very bad condition, and from £1000 to £1500 would soon have to be spent on it for repairs. There was a very small amount of profit derived from South Dunedin. Wear and tear at the gas-works and depreciation were considerable. If the gas-works were offered to him on lease, he would require them to be put in repair before entertaining the offer; for, as a fact, half the apparatus was absolutely worthless. With respect to the balance-sheet sent out by the Corporation, he confessed he had been mystified by it.

This was all the evidence in support of the objection.

Sir R. STOUT said he had never heard of a case being brought into Court on such flimsy evidence as that now adduced. The City Corporation had paid the valuation charged on the gas-works continuously since 1876. For the last five years they had been rated at £3000; and no reason had been shown for objecting to the sixth assessment, which was for a like amount. They had not even produced their books to show what the profits from the works were, but had carefully concealed from the Court all the evidence that would assist his Worship in determining what was a fair valuation. The Court must assume that, if there had been any good reason for appeal, an appeal against the valuation would have been made at least five years ago. When the Corporation determined to bring this case into Court, they should have been prepared to make a complete disclosure of the whole cost of the works and their value as a going concern. The Act was clear and precise that when any valuation was objected to, it was incumbent on the objector to show that the valuation was excessive. Without calling a single witness, he asked the Court to grant him what was practically a nonsuit—no evidence having been offered as to the letting value of the works.

His WORSHIP remarked that in some cases it was impossible to prove the letting value.

Sir R. STOUT said there was no such evidence in their case. It was to the effect that the works had a letting value, as there was an offer to lease them first for £8000, and then for £10,000 per annum. The balance-sheet which was put before the world by the Corporation, and certified to by their Auditors, was clearly false and fraudulent. This was actually admitted by the other side. He ventured to say that if any registered company had dared to go into Court and make such admissions as had been made concerning the Corporation balance-sheet in regard to the gas-works, the Judge would have strongly stigmatized their conduct. The point he relied on was this—that, though the onus of proving that the rate was excessive rested on the City Corporation, no evidence had been offered by them as to the letting value of the land, whereas evidence was before them that the works had a letting value.

Mr. SINCLAIR said his friend had been assuming that the property in question was within the borough of South Dunedin. The portion in South Dunedin was only a part of the whole; and it was impossible to give evidence as to what a part would let for. The property in South Dunedin should be ascertained, and then his Worship could fix an annual valuation upon it.

Sir R. STOUT proceeding to deal with the accounts, submitted that if the balance on March 31, 1888, were eliminated from the balance taken on account of interest, bank charges, and the transfers from the Municipal Department, the difference between the two would give a profit for the twelve months of nearly 10 per cent. interest on the cost of the works, assuming them to be worth £100,000. He would call evidence to show that the land and buildings were undervalued; and as to the plant, he would leave it for the books of the Corporation to speak for it.

Several witnesses having given evidence as to the value of the land,

Mr. *W. H. Cutten* adduced figures in regard to the plant, the value of which he put at £34,000, adopting the figure of £8 per ton taken by Mr. Graham.

Sir R. STOUT quoted from a Tasmanian paper, which showed that the annual value of a gas-works in Tasmania had been fixed at 6½ per cent. on the capital value.

Mr. CHAPMAN asked what was taken as the capital value.

Sir R. STOUT said the capital value had been taken on everything but the gasholders.

Mr. CHAPMAN then asked leave to recall Mr. Graham, as at a previous stage of the case he was not prepared with the necessary calculations.

Some discussion ensued as to whether or not this request should be granted. Eventually

His WORSHIP said he would acquiesce if the evidence was confined to simple facts on the point.

Mr. *Graham* was then re-called. He said he had calculated the relative values of the pipes in South Dunedin and in Dunedin, including the North-East Valley. He had made the value of the

works, including the land in South Dunedin, to be £30,000. The mains in North-East Valley were 8 inch, 6 inch, and 4 inch, and he had taken the average at 6 inch. The cost of laying a 6-inch main would be about £8 per ton. The value of the service at North-East Valley was £1621 13s.

This was all the evidence. After an interval of a few days, judgment was given.

His WORSHIP said: There is nothing very satisfactory in the evidence by which to fix the rental value. If I take the balance-sheet of the gas-works account for the twelve months ending March 31 last, I find in taking the proper items from each side of the account, and deducting the charge for interest upon the money sunk in the works, that the profit was £6029 11s. 7d. A rental value calculated upon this basis would, of course, require considerable reduction. Then there is evidence of offers to rent the works—first at £8000, and subsequently at £10,000 a year; but Mr. Thomson's evidence shows that it does not necessarily follow that the works are worth either of these rentals. Mr. Graham's evidence is to the effect that £8000 a year is too high; and if the profit is to be taken as the criterion, it certainly is so. There is no doubt that it is a difficult matter to prove a rental value, but, roughly put, if estimated upon the past profit, it would not exceed (say) £4500 to £5000 per annum. But the rateable value must not be less than 5 per cent. on the value of the fee simple. Now the value of property, as it appears in the last balance-sheet, is £96,462 10s. 6d.; and I should require very clear evidence to satisfy me that this was incorrect. I have contradictory evidence as to the value of the works, inside and outside of South Dunedin. Mr. Thomson's estimate of land and works in South Dunedin comes to £30,619; Mr. Graham's estimate is £30,664; and his estimate of value outside of South Dunedin, taking the value of pipes as averaging £8 10s. per ton, is £37,700, and at £9 per ton, about £40,000. Mr. Cutten's estimate of property outside of South Dunedin is £34,000; and there is other evidence that appears to show that the value of the land and works in South Dunedin exceeds Mr. Thomson's and Mr. Graham's estimates. The nearest I can get to it is that about one-half the value is inside the borough and the other half outside. It is a rough estimate, but it is the best I could do with the evidence; and it leaves a considerable balance between the estimated values and the amount shown in the balance-sheet as the value of the property. I reduce the valuation from £3000 to £2412, which is 5 per cent. on the half of the value as taken from the balance-sheet.

Rochdale Corporation Gas-Works.—The Gas Committee have reported to the Rochdale Town Council that they have accepted a tender of £765 from a local firm for alterations required to the engine-house at the gas-works; and also a tender from Messrs. W. C. Holmes and Co., of Huddersfield, for the supply and erection of a telescopic gas-holder, with wrought-iron tank.

Gas-Meter Rents and the Price of Gas at Darwen.—The Darwen Corporation Gas Committee have decided to reduce the rental of gas-meters owned by the Corporation in the borough, the reduction to take effect from the 1st inst. The rent per quarter will now be 2d., instead of 6d., for a 2-light meter; 3d., instead of 9d., for a 3-light meter; and for other meters, one-half the rent previously charged. The price of gas used for stove and engine consumption is to be reduced from 3s. 6d. to 2s. 6d. per 1000 cubic feet.

The Rejection of the Whitehaven Gas Company's Bill.—The Whitehaven Town and Harbour Trustees, at their meeting a few days since, congratulated themselves on the rejection by the House of Lords Committee of the Gas Company's Bill, to which reference was made in our leading columns last week. The Chairman (Mr. J. Musgrave) said he felt assured that the success of their opposition would be satisfactory to the inhabitants. The Bill having been thrown out, would probably effect a very material saving in the rates of the town for many years to come. The Company had carried on their proposals, although the Trustees endeavoured, by all reasonable means, to come to a friendly arrangement for the purchase of their property. Those negotiations failed, not on the part of the Trustees, but on the part of the Company. Probably they felt pretty sure of having their own way in Parliament; but proceedings there were very uncertain. Having stopped the Bill, and given an undertaking that the Trustees themselves would go to Parliament next session to procure powers in regard to gas supply, probably in a short time the ratepayers would have the benefit of gas-works of their own. He suggested that, if the Trustees thought fit, they should re-appoint the Committee who had had charge of the opposition, in order that they might take into consideration what measures should be adopted in regard to the purchase or establishment of gas-works for the town. This suggestion was unanimously acquiesced in by the members.

Interfering with Public Lamp Regulators.—The Surveyor to the Sheerness Local Board of Health has reported that the regulators have been extracted from eleven of the metered public lamps, whereby the gas consumed is more than 4 cubic feet per hour. The surveyor states that, as the regulators have been removed for years, about 25 per cent. more gas has been paid for than has been consumed. The matter came up for discussion at the last meeting of the Local Board, when a letter was read from the Gas Company denying all cognizance of the removal of the regulators. The Directors expressed themselves as of opinion that the regulators had been taken away within a few days only; and they also accused the Board of a want of courtesy in not inviting a representative of the Company to be present at the inspection. They likewise intimated that they were taking counsel's opinion as to whether the Board had power to touch the burners, which are the property of the Company. They further challenged the Board, if they had any charges against the gas officials, to make them in a proper way. After the letter was read, the Board passed a resolution expressive of their confidence in their Surveyor; and a reward of £25 for information as to the removal of the regulators was authorized to be given. The Board exonerated the Directors of the Gas Company and their officers from any knowledge of the affair. An astonishing fact which transpired during the proceedings was that the records of the meters taken on the 1st inst. showed that the consumption of gas for the quarter was below the average.

MISCELLANEOUS NEWS.

THE STRIKE OF GAS WORKMEN AT LEEDS.

The Late Riots.

At the various gas-works of the Leeds Corporation, there is now little evidence of there having been such a serious state of affairs as was recorded in these columns last Tuesday. The stokers returned to their duties at the York Street station at six a.m. on Monday of last week; and this brought the disorganization of the works to an end. There has since been a regular supply of gas throughout the borough.

In a report on the riots made by the Chief Constable (Mr. Webb), he alleged intimidation on the part of Mr. W. Cockayne, the local Secretary of the Gas Workers' Union, and Mr. Tom Paylor, one of the leaders of the locked-out men. According to the official statement, the act or acts complained of took place in Victoria Road and Meadow Lane, and while the police were escorting imported workmen from the Midland Railway Station to the Meadow Lane Gas-Works early on the morning of the 1st inst. The issuing of summonses was delayed last week to see how matters developed. The question whether or not proceedings should now be taken was considered by the Watch Committee on Wednesday morning, when they decided not to proceed either against Mr. Cockayne or Mr. Paylor.

There were seven cases of assault and rioting in connection with the dispute before the Magistrate (Mr. Bruce) at the Town Hall on Wednesday. The accused were charged with throwing stones, assaulting the police, and riotous conduct. The Town Clerk stated that he had conferred with the authorities; and it was decided that, in view of the present peaceable state of the town, and taking into consideration the fact that the defendants had been in prison for a week, the charges should be withdrawn, and the cases not proceeded with. Mr. Bruce said that, after what the Town Clerk had stated, he himself did not see why the charges should not be withdrawn. He had no desire to raise an objection in a case of the kind. Defendants, who had reason to congratulate themselves upon the turn events had taken, would be discharged.

The Leeds Watch Committee have decided to pay the members of the Leeds police force half a week's wages in remuneration for the extra work imposed upon them during the disputes with the gas stokers.

The Council and the Strike—A Proposed Vote of Censure.

A Special Meeting of the County Council was held last Thursday—the MAYOR (Mr. Alderman Emsley) presiding—for the purpose of discussing the whole proceedings connected with the recent dispute between the Gas Committee and their workmen. Notice of the following resolution had been given by Messrs. J. Gordon, jun., T. Harland, W. Battle, A. Cooke, and W. Metcalfe: "That the Council deeply regrets the manner in which the Special Gas Sub-Committee, appointed on June 16, has carried on its relations with the Leeds gas stokers, and desires to express its entire disapproval of their actions up to noon on Wednesday, the 2nd inst."

Mr. GORDON, in moving the resolution, observed that the town had recently been disgraced by riot and disorder; and he desired to place the responsibility for this upon the proper shoulders. It was suggested that the Sub-Committee appointed by the Gas Committee had no legal responsibility. It had, at least, moral responsibility of the gravest possible description; for it was their action which led to the riot and disorder. It was further said that the Town Council was responsible. No statement could be more untrue than that. The Council confirmed the minutes of the Gas Committee simply on faith. The minutes were not read, nor had they been printed and laid before the members, who were told by the henchman of the Chairman of the Committee that the rules which had been drawn up merely meant a re-arrangement of the labour at the gas-works. He accepted that statement; and so far as that landed him in any responsibility, he was prepared to take it. He asserted, however, that the confirmation of the minutes under these circumstances could not make the Council responsible for what had taken place. The Council was certainly not to blame for the methods employed by the Sub-Committee; and therefore not for what ensued. He charged the Sub-Committee with having neglected to give effect to the terms of their appointment, which prescribed that they were to report to the General Committee; and they were allowed to do as they liked until the stokers had brought them to their knees. It was not necessary to seek to bring contempt upon Alderman Gilston and his associates. They had done that sufficiently themselves; and he said that they were entirely to blame. In his opinion, the Mayor, the magistrates, the military, and the police were entitled to the greatest credit; for, under the most trying circumstances, they had come out of their difficulties very well indeed. If the Committee meant to fight, they ought to have made their case public. They should have reported from time to time. He contrasted their conduct in this respect with that of the men, who, he said, made a business-like, convincing statement of their case. The silence of the Committee brought the gas stokers the sympathy of their fellowmen. Alderman Gilston never tackled the arguments which the men put forth. He regretted that the Corporation had not the services of a General Gas Manager; for, in his opinion, such an official might have prevented the whole of the trouble by not allowing a headstrong Committee to take the course they had done. The Sub-Committee were wrong in proceeding by way of retaliation. They ought to have made it a question of re-arrangement. They were also wrong in refusing to receive a deputation from the men, because it was to be accompanied by a paid secretary. In dealing with a popular body, it was unwise to draw fine distinctions. The men did not understand them, and believed that the Sub-Committee were "tricky." Alderman Gilston had told them that he had done his best; but he did not meet the men until they were winning. Why did he not have a conference with the men before the disorder took place? The fact was, he had rather a poor case. If the Sub-Committee had meant to win, why did they not attempt to take the imported men into the works when the town was at work? On the contrary, they could not have made the attempt at a worse time than they did; and whether they chose that time or had

the time forced upon them, they were equally foolish, and the men outgeneralled them. But as to how the battle was lost and won, he did not suppose they would ever get to know definitely, for the minutes of the Committee were exceedingly meagre. He could not help thinking that some of the minutes had been thought of afterwards.

Alderman GILSTON observed that he thought that was scarcely fair to Mr. Yates, the Committee Clerk.

Mr. GORDON said that Mr. Yates knew him quite well; but there were people who were Mr. Yates's masters. It was obvious that the minutes had been thinned; and that the Committee thinned them, he had not the slightest doubt. The Committee altogether forgot the cardinal principles that ought to govern a dispute of this kind. Men should not strike, and masters should not lock out their men, unless under certain circumstances. First, they ought to be in the right; secondly, they ought to be able to show that they were right; and, thirdly, they ought to be absolutely certain that they were going to win. None of these conditions were present so far as the Sub-Committee were concerned. Their move was of a retaliatory character, and, therefore, was a blunder. They fought their battle badly and lost, deservedly lost; and they richly merited censure.

Mr. WILLEY, having seconded the motion, proceeded to point out several actions on the part of the Sub-Committee which were calculated to exasperate the stokers, laying especial emphasis on the employment of the old hands to prepare quarters and make things comfortable for the new men who were coming to take the bread out of their mouths.

Mr. HUNT hoped the Council would reject the resolution; and he asked if the Committee were to be condemned for actions that were legal, while those who had used bludgeons were to be complimented. Satisfactory arrangements had now been made between the Committee and their men; and the best thing they could do was to let well alone. He was prepared to take any share of the blame which might devolve upon him, though the men had refused to treat with them from the commencement until they were beaten.

Alderman SPARK said that the statement which had just fallen from Mr. Hunt was a very remarkable one, in saying that the men had never shown a desire to meet the Committee. [Mr. HUNT: That is so.] He did not agree that the General Gas Committee were altogether free from blame; for when they saw that matters were taking the course they were, it was the duty of the members who were not on the Sub-Committee to have insisted on having a meeting called. Then the Mayor, who was a member of every Committee, was never consulted upon the matter at all. In November the men's Committee were freely met by the Gas Committee, and an arrangement was come to. But the men asked for something more tangible than was offered; and they obtained from the Managers, acting on behalf of the Committee, a notice to the following effect: "At a meeting of the Gas Committee the terms of the men have been granted in every particular." There was nothing then said to the men about the arrangement being a temporary one. It was also agreed that the rules should be drawn up on the basis of the arrangements made; and that the Gas Committee were to meet the men and go over the rules. This was a fair and proper thing; but it never was carried out. In January, Mr. Cockayne, the local Secretary of the men's Union, wrote a letter asking why the rules had not been drawn up.

Alderman GILSTON: It was in December when he wrote.

Alderman SPARK said a reply was sent to the letter to the effect that the rules would be gone on with at the earliest convenience; and he believed it was the intention of the Gas Committee to carry that idea out. The matter, however, remained in abeyance until Good Friday, when the stokers were not paid as had been arranged. A deputation, with Mr. Cockayne, waited upon the Gas Committee; and they were allowed to sit in a room for an hour and 45 minutes before any notice was taken of them. Then the Secretary (Mr. J. Lupton) came and told them that they need not wait; and they would receive an answer by the following day's post. That was not proper treatment. A letter was written by the Town Clerk, and sent to the men's Committee, declining to have anything to do with a deputation unless composed exclusively of their own men. The men called a meeting, and said that rather than there should be any excuse they would send a deputation. They wrote a letter saying that; but no reply had ever been received to it. A week or so afterwards, when the Chairman of the Gas Committee was at the gas-works, some of the men asked him about the Good Friday pay, and he replied: "If you want to know anything about that, you must send a deputation." The men answered that they had already intimated a desire to send a deputation, but had not received any reply. This was regarded as insubordination; and although the Manager was away at the time, on the following day he gave written notice to the two men who had spoken to Alderman Gilston to leave their employment. [Cries of "Shame."] The Chairman denied that he gave any instructions for that to be done. The Manager (Mr. G. Tooley) said he did; and the matter rested between him and Alderman Gilston. But notice was given to the men because they had dared to speak, though the notices were afterwards withdrawn; the men having seen Alderman Gilston, and stated they had no intention of being insubordinate. He understood that the reason given for the non-payment of the Good Friday pay was that the Committee were not aware that the payment had been made on Christmas Day. It was extremely strange that such a state of affairs should exist. Late in May or early in June, the men saw the rules for the first time; and they were entirely different from those which had been agreed upon in November. Upon what grounds and for what reason, he asked, had these rules been withheld from November until the beginning of June. A few days after the issue of the rules, an order was posted asking what men were prepared to work under them; and the fault lay with the Committee or the Managers that the men were never told the Committee were prepared to discuss the rules.

Alderman GILSTON said he had shrunk from nothing up to the present; and he was acting now in what he believed to be a correct way. Alderman Spark seemed to have had a brief carefully, but not accurately prepared. He wished he could say that the press of Leeds had been in the hands of men who were patriots first and earned their bread afterwards. He did not think he should be capable of making a good newspaper editor, such as sat in some of the editorial chairs in Leeds. Nor did he think he should succeed as a money lender or a bill discounter. (Interruption.)

Mr. BATTLE: That is the way this man dictates to his Committee. (Turning to Alderman Gilston): Your insolence only exceeds your ignorance.

The MAYOR (to Alderman Gilston): Kindly calm yourself as well as you can.

Alderman GILSTON said that he had not mentioned a single name. Alderman Spark had told them about the want of thought of the Committee; and the irritating way in which they had dealt with the stokers. He had even told them that because some of the men in the works had been offensive and insulting to him (Mr. Gilston), he had had them discharged. There was not one word of truth in this. Between the time these men spoke to him and received their notice, he had never seen Mr. Tooley; and he did not know of notice having been given until the men told him, and asked him to intercede for them. In fact, he should have been ashamed of himself to have done anything of the kind. As to the deputation referred to, when he was in the works the men came round him, and some were anything but polite. They wanted to know about the Good Friday pay; and he told them that if they wished to discuss the matter they must send a deputation to the Committee, who would be glad to listen to what they had to say. From that time to the present, he had heard nothing further. Alderman Spark had also said that the men were not consulted about the rules. In October last, the Committee were not consulted about the rules the men sent. The men then said: "That's what we're asking for, and that's what we shall have." He told the men then that if they would be reasonable in their demands, he would endeavour to get as much for them as he could; and he told them that he was prepared to help them to get an advance—either an increase in wages or reduction of work, something between 15 and 20 per cent. But they said they would have all they asked for; and, as a matter of fact, he had to leave a Council meeting at the last moment, forced to do the bidding of these men. Had he not done this, the town in November would have been in darkness. Prior to this the town had been picketed for a whole week, and not a man went near any of the three works in search of employment. The Press had held the Committee up to the scorn and ridicule, aye, and more than that, to the danger of an excited mob. If there was any party in the town more to blame for the outrages and insults liberty had received, it was the proprietors of the Press. With regard to the Good Friday question, he wished it to be understood that the men made rules; and they distinctly said in those rules that for Good Friday and Christmas Day, if working, double pay should be had, and one week's holiday during the year and pay for it. The Committee found that they had entered into an arrangement to pay the men for one week's holiday; but they never said that, if they were not working on Good Friday, they should still be paid. Since, however, the men had given up the week's holiday, they were prepared to concede the Good Friday pay. They had been told that they had muddled and bungled. They laid no claim to perfection—they had their share of human frailties; but he did not know that there was anything that they had done up to the present, that they should not be prepared to do over again, if the same circumstances arose. It was the rules that had brought about all the confusion. The Committee had prepared the rules and sent them to each of the works; and the Managers were instructed to have them posted in the works and to tell the workmen on the spot that the Gas Committee were prepared to receive a deputation and listen to any objection they might have to them. He had it on the authority of each of the Managers that this was done. But supposing that it had not been done, at the last Council meeting after the issuing of the rules, he stated that the Gas Committee were prepared to receive a deputation. The Committee had found that there was an advance of 42½ per cent. in the cost of carbonizing coal; and they thought that was out of all proportion. In the interests, not of themselves, but of the ratepayers whom they served, they felt bound to deal with the men on commercial lines; and therefore to make out rules which would bring about a reduction in the cost of carbonization to the extent of about 20 per cent. When the rules were put in force, they heard nothing about them, the men would not speak; and the Committee asked what was to be done. They were advised that their clear course was to give notice, as the men intended to do nothing. That was done; but they pointed out that any man who wished to remain in the employ of the Corporation could do so. They had no response to that; and on the 16th ult., the Gas Committee appointed a Sub-Committee to see to the carrying out of the rules, and to engage new men. Before the notice was given, he wrote to Mr. Beckworth, the Chairman of the Committee of the Chamber of Commerce, asking if this was not a suitable case for the Board of Conciliation they were contemplating forming; but from his reply he found that the gas stokers would have no conciliation, and Mr. Beckworth was afraid that there was little hope. In addition to that, he also went to the Secretary of the Leeds Trades' Council, which represented the artizans of the town, and told him he was prepared, on behalf of the Committee, to receive a deputation of the men for the purpose of discussing the rules. There was no response; and the Committee had to make the best defence they could. The Sub-Committee, as instructed by the General Committee, engaged men and bought beds and provided food for them. They engaged the men in London and Manchester, and they brought every man they wanted to the railway stations; and if they had managed to get them into the works on the morning of their arrival, the town would not have been short of gas for a single hour. He was sorry to say that the forces of law and order in the town were too weak to protect Englishmen in the discharge of their duty against mob law and violence. For the part taken by Mr. Beckworth and Colonel Harding, all praise was due. He was only sorry that they did not see their way to take that step sooner. If Mr. Beckworth had acted as he had suggested on the 14th of June, and sought to have brought about a conciliation, the whole of the turmoil might have been spared the town. When Mr. Beckworth asked the men if they were prepared to meet the Committee, they said they were; but the Committee were crossing the stream then. They, however, willingly met them. At the first meeting, the men said they would stick to their terms. On the second day, the Committee were masters

of the situation. They then had 150 men making gas, under ample protection; and they were satisfied with their work. The gasholders were rising, and people knew it; so that, when the deputation came on the following morning, there was an air of conciliation about them which he admired, and the result was that through the tact and judgment of the two gentlemen he had referred to, mutual concessions were made, and they finished at a point which, if it had been arrived at last October, would never have been revived. The Committee had arranged for a month's notice, and the other concessions made meant a saving of nearly £6000 a year. This was a point gained which no Committee need regret. In conclusion, he asked the men to banish from their minds any ill-feeling towards the Committee, and he could assure them that no man would suffer for any part he had taken in the recent agitation. He moved, as an amendment—"That the Council approve of the acts of the Gas Committee in reference to the recent disputes with the gas workers of the Corporation."

Alderman FIRTH said he had never listened to a more contemptible speech in the Chamber than that of Mr. Gordon. That gentleman gave notice of a resolution condemning the Committee, of whose actions he knew nothing. He had been and heard what the men had to say; and on the statements they made, he condemned a responsible and respectable Committee without trying to ascertain whether there was any other side to the question. Mr. Gordon had charged Mr. Yates——

Mr. GORDON: I charged the Committee; and I stick to my charge.

Alderman FIRTH, continuing, said that Mr. Gordon asserted the Sub-Committee had yielded to violence. One would have thought that he would have condemned the violence, but he did not. Turning to the criticism of Alderman Spark, he said the contention seemed to be that only one side was to be believed. It was said the Committee ought to have sent for the men. Alderman Gilston, who bore an honoured name, had distinctly stated that he gave the men every opportunity of meeting the Committee; but they spurned the invitation. Attempts had been made to place the responsibility of the riots upon different parties. He believed there had been influences at work that had tended far more to bring about the disturbances than anything the Committee had done. He referred to the press of the town, which ought to have been on the side of law and order. He hoped the Corporation would seriously consider the question before it condemned a Committee which had been trying to discharge its duties faithfully between the gas workers and the ratepayers.

Mr. HARLAND stated that the management of the Leeds Gas-Works had become a bye-word; and the country at large, and Leeds in particular, condemned the conduct of the Committee most strongly. He contended that Alderman Gilston had not answered the allegations; and, by his amendment, he was seeking to shelve the matter. He believed that had the men been treated as men, and had there been reasonable conciliation, the recent trouble would never have occurred.

Alderman HARRISON emphatically stated that the minutes of the Sub-Committee had been issued exactly as Mr. Yates prepared them, according to the usual practice. He was prepared to take his share of the responsibility for the action of the Committee. Had the men shown no more judgment than Mr. Gordon and his friends, he maintained that there would have been no settlement such as had been come to. He submitted that there had been no surrender; but that a fair compromise had been effected.

Mr. HENRY remarked that evidently very few of those who had discussed the question understood it. The argument used all along was that the whole of the arrangements had been in the hands of the Sub-Committee. It was not so. The Sub-Committee did not come into existence until the works had been cleared; and they had no other duties than to fill the places of the old men. The resolution which had led up to the formation of the Committee had the sanction of the Gas Committee; and it was cowardly of the members of the General Committee to try and shirk their responsibility. He asked what the Sub-Committe had done that they should be censured. Their duty was to engage men; and they took the only step open to them. They brought the necessary men to Leeds at two o'clock in the morning; and the authorities were warned of the time and of the proportion in which they wished them put into the works. If the authorities had had sufficient force to cope with the difficulty, the lawlessness would never have been heard of; but the men would have been at once taken into the works. But to say that the Committee were beaten was to say what was absolutely untrue; and, as a matter of fact, Mr. Beckworth had told the men that the Committee were masters of the situation.

Alderman BAKER thought it would have been much better if the opposition had allowed things to remain as they were, without seeking to stir up ill-feeling; but a field-day seemed to be considered necessary. He should vote for the amendment, not because he approved of everything the Gas Committee had done, but because he strongly disapproved of the absurd resolution which appeared on the notice paper. That was clearly a party move for the purpose of protecting from censure the Conservative members of the Gas Committee.

Alderman WARD defended the Committee; observing that the fact that a settlement was not effected before the disturbances was in no way their fault.

Mr. TEALE charged Alderman Gilston with being tyrannical in his manner of presiding over the Gas Committee.

Mr. BATTLE said the whole of the facts of the case should have been brought before the Council in June, and a vote taken thereon; but not a word in explanation was uttered. He admitted that the Chairman of the Committee did his best to conciliate the men, but not until it was too late.

Mr. WOMERSLEY thought the Sub-Committee had shown a want of tact. Having given way in November, and increased the price of gas, it was hardly wise to take the steps the Committee had done, unless they were perfectly sure they would succeed.

Alderman LOWLEY defended the action of the Sub-Committee, and regretted that the men were not subject to a four months' engagement during the winter months.

Mr. DYSON stated that a fortnight ago he informed Mr. Cockayne that the Sub-Committee then sitting would be glad to receive a deputation from the men, along with himself, with the view of effecting a compromise, and that the Secretary of the Trades' Council had told Mr. Cockayne that Alderman Gilston had informed him that he was wishful there should be a resort to arbitration. Mr. Cockayne replied that the men would have nothing to do with arbitration.

Mr. GORDON, in reply, said that the great point upon which he found fault with the Committee was that he was convinced, even if they had been in the right, they could not have won in the struggle owing to the way in which they had conducted it. He did not refer to the rules at all, but to the "beastly" way in which they sought to enforce them. It was Alderman Gilston's method of approaching the question which to a great extent had led them into the difficulty; and the whole of his remarks were really a beating of the air as regarded the attack on the Sub-Committee.

The division was then taken, and resulted in Alderman Gilston's amendment being adopted by 31 votes to 20. When the figures were made known, they were received with applause and some hisses.

THE BRISTOL GAS COMPANY AND THEIR WORKMEN.

Claim for Pay during Sickness—Arrangement with the Men.

Early in May last, a workman in the employ of the Bristol Gas Company, named James Granger, sued the Company in the Police Court for £8, wages accruing during illness. The facts of the case were these: On the 4th of March last he was unable to continue at work, and became so unwell that he had to go into the Infirmary for treatment. He informed the foreman of the works that he was not then in a condition to resume his work; and week by week he continued to give notice to this effect. On the 29th of March he received notice from the Company that his services would not be required after the 5th of April. He claimed the money to which he was entitled so long as he was in the employ of the Company. In support of the claim, it was argued by Mr. H. H. Gore that the fact that the plaintiff was unable to continue his work did not militate against his title to his wages; and he quoted several cases in support of his contention. Moreover, the notice being given by the Company on the fifth week of the man's illness was, to his mind, a practical acknowledgment of continuous service up to that time. One of the Magistrates asked Mr. Gore if he meant to say that, without notice from an employer, a workman might continue to draw wages for seven years, though he were ill all the time. Mr. Gore replied certainly, until the employer gave the workman notice. The complainant was examined by Mr. E. Leonard, on behalf of the Company, and stated that after he went to the Infirmary he did not receive any money from them. The Magistrates dismissed the case, but refused to give their reasons for so doing. They, however, expressed their willingness to state a case for a Superior Court. In due course this was done; the appeal being entered for hearing in the Queen's Bench Division. The case has since been struck out of the list by consent, on the Company paying the full claim and the costs of the applicant. Referring to this case, the facts of which were supplied by their local correspondent) in their issue for the 5th inst., the *People's Press* stated that Granger's illness was caused by an injury received in the Company's service; and that their action in eventually paying the claim was a practical admission of the justness of Mr. Gore's contention.

According to paragraphs which have lately appeared in the Bristol papers, the relations between the Directors of the Company and the workmen have now been placed on a more satisfactory basis. Since the recent strike, several questions, as our readers are aware, have arisen for settlement; and when Mr. J. W. S. Dix became Chairman, he expressed a desire to thoroughly understand the position the men took up, and to arrive at a complete settlement with them if the nature of their demands permitted this to be done. There had for some time been negotiations between the Directors and the men with regard to a re-arrangement of the system at the different stations; and the Directors expressed a wish that the men would meet and endeavour to frame a plan of their own. This they did, and presented their proposals to the Chairman and the Chief Engineer (Mr. William Fiddes). A deputation of the workmen from the three stations met these two gentlemen, and after a long conference an agreement was arrived at and duly signed. In order to confirm the arrangement and give an opportunity for discussion with the general body of the men, the Chairman and the Engineer were invited to meet the workmen, so that any difficulties suggesting themselves to the men's minds might be met and explained. Accordingly, a conference was held; Mr. Vickery, Chairman of the local branch of the Gas Workers' Union, presiding. Addresses were delivered by the Chairman of the Company and by the Engineer; and a full discussion upon the various points of agreement ensued. This was followed by a unanimous vote of thanks to Messrs. Dix and Fiddes, for the manner in which they had met the general body of the workers. Neither the Directors nor the men's representatives thought that any good results would be derived from publishing the details of the agreement; but both sides, it is said, regard with satisfaction the fact that a solution has been found in the way mentioned, and they think good results would attend a similar method of settling differences if it were adopted by other Boards of Directors and leaders of men.

Tipton Local Board Gas Supply.—The accounts of the Gas Department of the Tipton Local Board for the year ending March 25 last have been issued. The sale of gas (at prices rising by 2d from 2s. 3d. to 2s. 9d. per 1000 cubic feet, less 5 per cent. discount, and no charge for meter-rent) produced £9314, as compared with £8741 in the year 1888-9; the total receipts being £12,648, against £11,344. The expenses were £8154; leaving a balance of £4494 to go to the profit and loss account, as compared with £4032 last year. The net profit for the year just closed was £995, against £641 in the previous twelve months; and £250 of it were employed in the relief of the district rate (which includes the expenses of the Free Library and Reading-Room)—the balance being carried forward. The working statement of the Engineer and Manager (Mr. Vincent Hughes) shows that 8077 tons of coal were carbonized, producing 83,720,000 cubic feet of gas, of which 93,692,420 cubic feet were sent from the works. There was a slight reduction in leakage last year.

METROPOLIS GAS SUPPLY.

The Chief Gas Examiner for the Metropolis (Dr. Williamson, F.R.S.) has presented his report on the quality of the gas supplied by The Gaslight and Coke, the Commercial, and the South Metropolitan Companies, during the quarter ending June 30, 1890. The following is an abstract :—

I. *With respect to Illuminating Power.*—The average illuminating power, in standard sperm candles, at each of the testing-stations, was as follows :—

The Gaslight and Coke Company—	
Jewry Street, E.C.	16·4
Cloth Fair, E.C.	16·4
Dorset Buildings, E.C.	16·4
Ladbroke Grove, W.	16·7
Devon's Road, E.	16·7
Carlyle Square, Chelsea, S.W.	16·1
Camden Street, N.W.	16·4
Graham Road, E.	16·7
Kingsland Road, E.	16·5
Spring Gardens, S.W.	16·2
Grove Gardens, Regent's Park, N.W.	16·5
Hornsey Road, N.	16·7
Lambeth Road, S.E.	16·2
Millbank Street, S.W. (cannel gas)	21·1
Commercial Gas Company—	
Parnell Road, E.	16·5
Wellclose Square, E.	16·4
South Metropolitan Gas Company-	
Hill Street, S.E.	16·2
Foster Place, S.W.	16·4
Stoney Lane, S.E.	16·6
Lewisham Road, S.E.	16·4
Burrage Road, S.E.	16·3
Blackfriars Road, S.E.	16·4

It will be seen from these results that the average illuminating power at all the testing-stations has been higher than 16 candles—the requisite standard. Slight deficiencies were returned during the quarter from the stations at Jewry Street, Dorset Buildings, Carlyle Square, Kingsland Road, and Spring Gardens. The gas made by the Commercial Gas Company did not fall below the requirements even when weakest. The South Metropolitan Gas Company appealed against the following returns of illuminating power: Hill Street, May 19, 15·4 candles; Blackfriars Road, April 25, 15·4 candles; do., May 30, 15·4 candles. After hearing the parties Professor Williamson certified that the returns of low illuminating power at Hill Street, on the 19th of May and at Blackfriars Road on the 23rd of April must be accepted; and that the low illuminating power at Blackfriars Road on the 31st of May was due to an unavoidable cause or accident.

II. *As regards Purity.*—Sulphuretted hydrogen has not been present in the gas at any of the stations. The average amount of sulphur in other forms has been considerably less than that allowed—viz., 17 grains at all the stations. Ammonia has generally been present in the gas at all the stations more or less frequently, and sometimes rarely, and then only in small quantities. The amount allowed (4 grains) has not been exceeded on any occasion.

MAURITIUS GAS COMPANY, LIMITED.

The report which the Directors of this Company will present to the proprietors at their meeting to-day, states that the accounts for the past year show a balance of £548 to the credit of profit and loss—an amount which they say would have been nearly extinguished by loss on exchange had the remittance since received been forwarded before the end of the year. Owing to heavy payments in Mauritius for coal and impending cash requirements in regard thereto, the amount remitted home in 1889 was considerably less than during the previous year. A greatly reduced charge for exchange consequently appears in the accounts. In regard to the public lighting, the Company have again been subjected to heavy uncalled-for deductions by the Municipality for alleged contraventions. The private consumption of gas shows a further serious decline. The diminution is attributable to the continuous removal of the better class of consumers from the town to the country, and the competition of cheap oil. The quantity of gas supplied to the Theatre and the public buildings also shows a considerable falling off. The price of coal ruled very high, and importations could only be made at onerous rates. The stock on hand will suffice for all requirements till the end of the Company's operations, unless any unforeseen circumstances should arise. Acting upon the authority given to them by the shareholders to abstain from tendering for the continued lighting of Port Louis, beyond the expiration of the existing contract in October next, and also to dispose of the property of the undertaking on the best terms possible, the Directors specially deputed the Hon. J. A. Ferguson—a gentleman of position and influence in Mauritius, who has been a member of the Local Committee from the first—to open negotiations with the Municipality of Mauritius for the sale to them of the property on reasonable terms. He at once set earnestly to work to affect this object. But, unfortunately, his efforts entirely failed; and the Municipality have not only declined to consider the question of purchase on any terms, but contemplate the substitution of oil for gas. The Directors, however, think it very doubtful that this will be practicable; and they regard the re-opening of the negotiations as still possible. Mr. Ferguson has returned to England, having, by authority of the Directors, transferred his powers to the Hon. H. Adam (likewise a member of the Local Committee from the beginning), who will use any opportunity that may present itself of re-opening the question and achieving the desired object. In the meantime, there is no alternative but to comply with the terms of the contract until its expiration on the 6th of October next, and then to deal with the property as existing circumstances may require.

BIRMINGHAM CORPORATION GAS SUPPLY.

The Gas Testing Question.

The Gas Committee of the Birmingham Corporation have prepared for presentation to that body a lengthy report, in which is included a statement by the Town Clerk, upon the law as it affects the testing of the gas supplied to the city. It is stated that on the appointment of the Gas Committee in 1875, on the transfer of the undertakings from the Gas Companies, the question of the provisions to be made for the testing of the illuminating power of the gas was carefully considered. Frequent observations, extending over some time, were made in the Old Square, showing a difference of about a candle between the illuminating power as tested there and at the works. This result confirmed the experience which had been obtained by the Gas Companies, in whose time tests had been made at the offices in the Old Square and in Union Street, as well as at the gas-testing station in Moor Street. The Gas Committee thereupon instructed the Engineers to maintain the illuminating power at the works at a minimum of 17 candles; the Gas Acts requiring 15-candle gas to be provided at the works. The Justices were informed of this decision, and undertook that the gas examiner should make the necessary tests at the four manufacturing stations which were then in operation in Birmingham. Subsequently, after the Fazeley Street works had been abandoned, and the transfer had been made of some of the outlying districts, it became necessary to supply a portion of the area within the city boundaries from the Swan Village works. The Justices were informed in 1881 of this change, and were asked to extend the tests by the gas examiner to the works at Swan Village. This they consented to do, if the Gas Committee paid the cost of the additional tests. After some negotiations the Gas Committee agreed to pay a sum of £25 per annum to the gas examiner in respect of the cost; and this payment continues to be made. There appears to have been hitherto some confusion in Birmingham between the functions of the meter inspector appointed under the Sale of Gas Act, 1859, and the gas examiner under the Gas-Works Clauses Act, 1871. This is possibly due to the fact that the same person has held both offices. The fees received for inspection of meters cannot be applied in discharge of costs or remuneration incurred in testing the gas; and the powers of the gas examiner, under section 28 of the Gas-Works Clauses Act, as limited by section 156 of the Birmingham Corporation (Consolidation) Act, 1883, only extend to testing the gas on some part of the gas-works of the Corporation, which is the prescribed place within the meaning of section 28. The Committee of Justices that has been formed for the purpose of gas-testing do not seem to be statutory. The gas examiner is the expert appointed under the Act of Parliament; and the Justices, as regards testing of gas, appear only to be able to act in a strictly judical capacity in the cases brought before them. As the result of this confusion, the Corporation have been, and are now paying, without any statutory power to do so, the salary of the gas examiner, as to whose conduct and remuneration they have no voice, but who is under the control of the voluntary Committee of Justices. The Gas Committee cannot recommend that this unauthorized and irregular procedure should be extended in the manner recently proposed by the Justices. The Committee have made enquiries of the principal gas undertakings in the country as to the provisions made for testing the illuminating power of the gas which they supply. They find that in only one of fifteen of the largest provincial undertakings in the hands of corporations, exclusive of Birmingham, is the illuminating power of the gas tested by the Justices. In all the other Municipalities, the tests are made by the Corporation; but in nine of them the tests are made by the medical officer of health, or by some other officer not on the staff of the gas undertaking. In eight of them the tests are made at the works only; in three, no tests are made at the works, but are made at the offices or Town Hall, or near the works; while in the other four tests are made both at the works and offices, or works and Town Hall. As regards fourteen of the principal gas companies, excluding those in London, the tests are, in almost all cases, made by the Corporation. Where not so made, they are left in the hands of the gas company; no testing having been required by the Justices. At six of them the tests are made at the works. In the remaining eight they are made away from the works. The distances at which the gas is tested away from the works in these towns vary from ½ mile to 1½ miles; and the difference between the tests made at and away from the works never exceeds a candle. The Committee are of opinion that it is unnecessary in the interests of the consumer, and would be unwise in the interests of the ratepayer, to disturb the arrangement for testing the illuminating power of the gas made in 1875 with the Justices after full consideration of the subject. The report points out that the tests should be made from a service taken direct from the main, in order to be perfectly reliable; and that even if these tests were efficient, they would only, under present circumstances, represent a portion of the gas supplied from one of the four manufacturing works of the undertaking. From each of these works, carrier mains extend in different directions to different portions of the area of supply. There are twelve carrier mains from the works; and it follows that to test efficiently the illuminating power of all the gas supplied after it has left the works, twelve photometric stations would be required. The cost of equipping such stations could not be less than £1500; and their efficient maintenance in accordance with the system of the Metropolitan Gas Referees, including the salaries of officers to make the tests, would not probably be less than £2000 per annum. The suggestion made by the Justices, to use rooms in buildings already belonging to the city, could only be very partially adopted. It appears to the Committee that so long as the tests at the works are efficiently made, the consumer has a sufficient guarantee that the gas supplied to him is maintained at the standard illuminating power which the Council have appointed as being ample for effective lighting when the gas is properly used; and the Committee say they would regard the large expenditure which would be necessary to establish and maintain an efficient system of testing away from the works as useless, and a waste of the Corporation funds. They are of opinion, however, that the arrangements for testing the gas at the works as now made by the Magistrates require revision, in order to be satisfactory to the

Corporation as the gas undertakers, and to the consumers. On the completion of the gasholder at Nechells, in 1877, a testing-station was erected there; and the then gas examiner was invited to make tests at that station as well as at the works. This, however, he declined to do, stating that this distributing station did not form part of the works, and that the proposed tests were beyond the duties imposed on him by the Act of Parliament. Consequently there has been no official test of the gas distributed through this holder. At Swan Village, too, sufficient precautions do not appear to have been taken to secure at least a weekly test of all the gas issued from these works, apart from the daily tests made by the gas department staff. When attention has been given to these two matters, the whole of the gas passing into the area of supply from the works will be subject to official tests. So far as the Committee can learn, the provisions in the Gas Acts as to testing the pressure of gas in the mains have not hitherto been exercised. The Committee are of opinion that the Justices should be asked to provide for a complete, and, if they think it desirable, a more frequent testing of the illuminating power of the gas distributed from the works, and that they should be informed that the Committee will gladly aid them in every way to render the tests at the works so complete and efficient as to leave no reasonable ground for doubt or suspicion as to the honourable fulfilment by the Corporation of the duties to the gas consumers which it has undertaken. Rather more than a hundred tests of the illuminating power of the gas have been made during the half year ended June 30 last—the highest return being 17·80 candles; the lowest, 16·51 candles; and the average, 17·30 candles, or 2·30 candles in excess of the parliamentary standard.

NOTTINGHAM CORPORATION GAS SUPPLY.

The Gas Committee's Annual Report—Increase in the Price of Gas.

The report of the Gas Committee of the Nottingham Corporation for the year ending March 25, with the accounts for this period, was presented to the Town Council at their meeting yesterday week.

In their report the Committee express regret that there was no material increase in the general consumption of gas during the past financial year doubtless owing to the continued depression in the trade of the district. The increase which did take place the Committee consider to be due to the extensive use of gas cookers and fires, which the general public are beginning to appreciate. The consumption of gas during the year was 1,293,346,800 cubic feet, against 1,287,771,500 cubic feet in 1888-9; being an increase of 5,575,300 cubic feet. The Committee, however, state with pleasure that the results of the year's working show additional profit. The net profit last year was £24,046 12s. 7d.; this year it is £26,698 5s. 2d.—being an increase of £2651 12s. 7d., notwithstanding an advance in the price of coal and other materials, as well as a rise in wages during a portion of the year. There is a considerable increase in the price of residuals (excepting in that of sulphate); and this assisted in keeping up the amount of the net profit. The Council directed that £20,000 of the profit of the past year should be paid over to the Finance Committee. The Gas Committee think it would have been desirable to carry the balance to the working capital, which is too low; but, under present circumstances, considering that in the current year there will be an increase in the cost of coal of 2s. 4½d. per ton, and that the additional cost of labour will be upon the whole year, the Committee have thought it better to place such balance to the profit and loss account, to be dealt with as the Council may determine. From the foregoing statement it will be apparent that at the close of the current year there will be little or no profit to hand over to the Finance Committee. While deprecating the increase in the price of gas simply to lessen the district rate, the Gas Committee feel that the Council, who act in the place of a gas company, are entitled to a reasonable amount of profit for management. Further, it must be borne in mind that the Corporation are supplying gas to a very large district beyond the boundaries of the borough. This district is served at the same price as is charged within the borough as there is no differential rate. The Committee point out that the cost of distribution and collection, and the percentage of loss by leakage, are very much greater in the external gas district than in the borough; and they think it is only fair, therefore, that the ratepayers, who have to provide the capital for the gas undertaking and run the risk of its success, and to whom gas could be supplied on easier terms if there were no outside district, should receive some benefit for the risk and trouble of managing the gas undertaking. At the present price of the gas annuities and of the Corporation stock, the borough rates of Nottingham are responsible for upwards of a million of money in respect of the undertaking, for which the outside district does not incur any responsibility. An increase of 2d. per 1000 cubic feet would probably produce an additional £10,000 or £11,000. This, with the estimated profit at the present price, and the balance £6698 5s. 2d. now placed to the profit and loss account, would probably leave a balance of profit at the close of the current year equal to the amount to be paid over to the Finance Committee this year. The Committee therefore recommend that an advance to this extent should be made from the Midsummer quarter. Subjoined to the report is a comparative statement of the gas and meter rental for the past two years. It shows that the total in 1888-9 was £152,752 12s. 8d.; in 1889-90, £153,152 3s. 7d.

The annual report of the Gas Engineer and General Manager (Mr. W. R. Chester), which is appended, states: "I have to report that the good condition and efficiency of the manufacturing plant at your various works have been fully maintained. The erection of regenerator furnaces in one-half of your No. 1 retort-house at the Eastcroft works has been completed; and the retorts were put to work in November last. Since then they have been working continuously, and have effected considerable saving both in fuel and labour. This system of heating retorts is now being extended to the remaining half of the house. The extensions of mains last year, and the isolation of certain low-lying districts from direct communication with the higher parts of the borough, have enabled the initial pressures at which the gas is supplied from the works to be somewhat reduced; resulting in a corresponding decrease in leakage. The loss by leakage this year is 5·74 per cent., against 6·06 per cent. last year—a reduction of ⅓ per cent., equivalent to nearly 4½ million cubic feet of gas. Further districts will be isolated this year; and it is confidently expected that the low figure now representing the leakage account will be still further reduced. The illuminating power of the gas has been maintained at 18½ candles; while the sulphur compounds have been kept down to an average of 14·26 grains of sulphur per 100 cubic feet of gas." Referring to the distribution department, Mr. Chester says that the total mileage of mains is now 264·89; there having been 1·99 miles added to the canalization during the year. The number of meters fixed to March 25, 1890 (including 269 lamp meters), was 37,892; being a decrease of 582 meters on the previous year. Of these, 36,085 belong to the Gas Department, and 1807 to the consumers. There were 1071 new services laid, against 1300 in the previous year. A census of the appliances used for cooking, heating, and trade purposes, other than for lighting, has been taken, the details of which are shown in the following table:—

Trade appliances—	
For gassing cotton, lace dressing, baking, boiling, coffee roasting, brazing, ironing, japanning, drying, &c.	1,342
Gas-engines	112
Domestic appliances—	
Boilers, washers, coppers	262
Ovens for baking only	169
Cookers complete	1,547
Fires and heating stoves	2,823
Small stoves for frying and boiling	7,138
Total	13,393

Of the 1547 cookers in use, 944 are rented from the Gas Department. With respect to the chemical works, Mr. Chester states that all the apparatus is in good working condition; but that it will be necessary during the current year, to extend the sulphate plant, which is not fully adequate for dealing in a satisfactory manner with the whole of the ammoniacal liquor produced during the winter months. Annexed to Mr. Chester's report is a table showing the comparative working per ton of coal carbonized and per 1000 cubic feet of gas made for the years 1888-9 and 1889-90. We extract therefrom the following figures; Year 1888-9: Coal carbonized, 130,564 tons; gas made, 1,370,909,000 cubic feet; gas sold, 1,287,771,500 cubic feet; unaccounted for, 83,137,500 cubic feet, or 6·06 per cent.; total receipts, £188,442, being 28s. 10·39d. per ton of coal carbonized, and 2s. 11·12d. per 1000 cubic feet of gas sold; total expenditure, £119,573, being 18s. 3·8d. per ton of coal, and 1s. 10·28d. per 1000 cubic feet of gas. Year 1889-90: Coal carbonized, 130,724 tons; gas made, 1,372,164,000 cubic feet; gas sold, 1,293,346,800 cubic feet; gas unaccounted for, 78,817,200 cubic feet, or 5·74 per cent.; total receipts, £196,502, being 30s. 0·76d. per ton of coal carbonized, and 3s. 0·46d. per 1000 cubic feet of gas sold; total expenditure, £124,076, being 18s. 11·78d. per ton of coal carbonized, and 1s. 11·02d. per 1000 cubic feet of gas sold.

Alderman BARBER, in presenting the report of the Committee, remarked that the year covered by it had been one of considerable anxiety to them, looking at the gradually increasing price of coal, and the difficulty which had arisen in connection with labour. He was pleased to say, however, as regarded the latter, that the whole business had been conducted very satisfactorily. The employees made certain requisitions to the Committee, who were desirous of meeting them as far as possible. The men had met them in a reasonable and proper way, and so the matter had been arranged. With reference to the price of coal, their contracts for the year were settled at an advance of 1s. 5d. per ton. They had at that time 10,000 tons to come in at a reduced figure; and during the year they had used some 20,000 or 30,000 tons of coal from stock at the lower price. So that really the additional cost of coal during the year had only amounted to £3210. The increase in wages had been £1290; and of material, £1000. So that the additional cost of coal, wages, and material came to about £5500. He was happy to say they had made or received an extra profit on residuals of £6600, or £1100 more than they had to pay for the higher cost of coal, &c. The total of their increased profit last year over the previous year was £2650. This additional profit, excepting that of £1500 from residuals, he attributed entirely to the care, anxiety, and attention given to the business by the officials in the employ of the Committee. They had, from the highest to the lowest, been most anxious that the results should be satisfactory; and this object had been attained. Passing from last year, it was very important to draw attention to the current year. The Committee had entered into contracts for coal at an advance of 2s. 4½d. per ton, as compared with an advance paid throughout the kingdom of from 3s. to 3s. 6d. They had still from 20,000 to 30,000 tons of cheaply-bought coal left, which they proposed to use during the year; so that they calculated the increased cost would be £11,500. The extra cost of labour would be £4000; and of material, £4500. Therefore the total increase on the year would be £20,000. It was also calculated that they would get an increase over last year of £3500 from residuals; leaving £16,500 as the additional cost on the works during the current year. Supposing the price of gas were continued at the same rate as at present, the Committee had no doubt that they would be enabled to supply gas to the town, and at the end of the year have a small margin of profit. It would be a question for the Council whether or not they would be content with this. As a Gas Committee, it was their duty to make the gas and supply it, and to insist on a price that would enable them to do this without loss to the town. They would be able to do it at the present price of gas; but if the Council felt that they would require the usual £15,000 or £16,000 to be paid over in aid of the district rate by the Committee at the end of the year, the only course would be for the Council to raise the price of gas 2d. per 1000 cubic feet. In the report there was a slight error, as it was stated that 2d. per 1000 cubic feet would produce £10,000 or £11,000. This, however, meant for the year; but inasmuch as, if the price were raised, it could only come into operation on the 24th of June, the increase would only be for three-fourths of the year. The raising of the price of gas must be entirely the act and deed of the Council. The members of the Committee had their own individual opinions about the matter, and would vote accordingly. They had in their report pointed out the mode by which the obtaining of £15,000 to £20,000 in aid of the district rate could be accomplished if the Council desired it. He moved—"That the annual

report of the Gas Committee, with the accounts for the year ending March 25, 1890, now presented to the Council, be received and adopted, and that an advance in the price of gas of 2d. per 1000 cubic feet be made, commencing on the 24th of June last, as recommended in the Committee's report."

Alderman J. P. FORD seconded the motion.

Mr. HILL asked Alderman Barber what proportion of gas was used outside the limits of the borough.

Alderman BARBER: About 12 per cent,

Mr. BENTLEY inquired how it was that this matter was not brought forward at the time the 4s. 6d. rate was made. He said the ratepayers were first asked to pay an additional 6d. on the district rate, and then an extra 2d. per 1000 cubic feet for gas. There was a great deal of feeling in the town upon the point.

Alderman BARBER said the Gas Committee had nothing whatever to do with the 4s. 6d. rate; nor did they raise the price of gas.

Alderman CROPPER said he should like the Council to vote on a clear issue; and he therefore moved, as an amendment, that the words in the resolution after "received" be omitted, in order to insert the following: "But that the recommendation to advance the price of gas 2d. per 1000 feet be not adopted." He said he thought he should be able to show that they were asked to put a new tax upon the trade of the town, which it was very ill able to bear. He asserted once more, as he had done half-a-dozen times previously, that they were sacrificing from £8000 to £10,000 a year by what he had persistently called, and should continue to call, their "coke fad." The Committee would insist upon buying a certain quality of coal, not because it was better for making gas, but because it yielded what was known as "eyeable" coke; and last year the Committee had to throw away 1800 tons which were not saleable. But there was another way in which the Committee could increase their revenue without dropping their "coke fad;" and that was by the general adoption of regenerative furnaces. He was glad to see that they had applied the system to a few retorts. Why should it not be adopted all round, and 2½d. per 1000 cubic feet of gas saved? In this way they would do more than the Council were now asked to do by raising the price. There was one very important reason why they should not increase the price of gas. Some members of the Council would be surprised to learn that there were 32,000 houses in Nottingham without gas supply.

Alderman J. P. FORD: I think it is 20,000.

Alderman CROPPER said the figures he had used were supplied by a gas official. He had some statistics which were laid before the Gas Committee in 1884; and the only alterations there could be now would be in proportion. They showed that 30,500 consumers of gas paid a revenue of £80,000, and 240 consumers in the borough paid a revenue of £41,000. His contention was that they wanted to tax 240 manufacturers for the relief of 30,500 small householders; and he asked if that was a business transaction. If the Council were in favour of raising the price of gas, he should be satisfied with the decision of the majority; but he hoped they would not blame him for having drawn their attention to what he considered the salient facts that would enable them to come to a wise and useful decision.

Mr. M'CRAITH seconded the amendment.

Sir J. TURNEY opposed the amendment. He said the mover had called their attention to the fact that there were 240 large consumers of gas, and had asked why they should be taxed to relieve 30,000 small householders. He (Sir John) asked why 30,000 small householders should be taxed to give 240 manufacturers gas at a lower price than that at which it could be conveniently manufactured. He thought one question quite as reasonable as the other. Why should the small householder, who used comparatively little gas, be taxed to give the large manufacturer his supply at a low rate? He protested against those who did not use much gas having to pay a heavy district rate to assist those who used great quantities, in order that the latter might obtain it at a low figure.

Mr. LEES said he should be glad if the Chairman of the Committee would explain how it was that in Yorkshire towns—such as Leeds and Hull—gas was very much cheaper than in Nottingham, although in those places there were not the same facilities as in Nottingham for obtaining coal.

Alderman CROPPER remarked that Leeds was a very inappropriate town to quote in relation to this matter. Although at Leeds the gas was cheaper than in Nottingham, they lost £10,000 last year. He then signified his intention of withdrawing his amendment with the permission of his seconder.

This was agreed to.

Alderman BARBER, in reply, said that, in his anxiety to condense his remarks, he had omitted to state one important matter. Although during the past year upwards of 500 meters had been let out less than in the previous year, the consumption of gas had increased by 5,500,000 cubic feet. But the point to which he wished to draw attention was the increased use of gas-fires and gas cooking-stoves. It was an interesting matter; and he hoped the increase would continue. The question for the Council was simply as to whether they would increase the price of gas 2d., or forego at the end of the year, the usual sum paid over to the Finance Committee by the Gas Committee. Referring to Alderman Cropper's remarks in reference to coke, he said the Committee obtained more than the average price for it—viz., 12s. per ton. With respect to the regenerator furnaces, they began to put up a considerable number last year; and he thought this disposed of Alderman Cropper's objection.

The motion was then put, and carried with a few dissentients.

The Proposed Abolition of Meter-Rents at Blackburn.—At a special meeting of the Blackburn Trades Council last Tuesday, a resolution was passed asking the Gas Committee of the Town Council to consider the advisability of abolishing deposits on meters, and also of reducing or abolishing entirely meter-rents. In the discussion of the subject, it was stated that the gas consumers of Blackburn paid every year for meter-rents alone £2021. A return from other Lancashire towns submitted to the meeting showed that in six nothing was charged for meters, and in a large number of others the figure was considerably less than in Blackburn.

BRADFORD CORPORATION GAS SUPPLY.

The Staff of the Gas Department—Proposed Purchase of Additional Land.

At the Monthly Meeting of the Bradford Town Council last Tuesday—the DEPUTY-MAYOR (Mr. Alderman Moulson) presiding—there was a protracted discussion on the above matters.

Alderman F. PRIESTMAN moved the adoption of the minutes of the Gas and Electricity Supply Committee, which embraced a special resolution re-arranging the Gas Department consequent upon the retirement of Mr. David Swallow (who is retained as Consulting Engineer), including the appointment of Mr. William Wood as Engineer, at a salary of £450 per annum, of Mr. Charles Wood as Deputy Gas Engineer, at a salary of £225 per annum, and of Mr. C. B. Holdsworth as Sub-Manager for indoor work, at a salary of £150 per annum; another resolution accepting the offer of the Bradford Banking Company, Limited, to sell to the Corporation premises adjoining the Valley Road gas-works, with the buildings thereon and certain fixtures, and containing an area of 5262 square yards or thereabouts, for the sum of £7750; and a third resolution, accepting tenders for the supply of cannel and gas coal. Regarding the future management of the department, Alderman Priestman said he need mention little, except that he had every confidence that it would work perfectly satisfactorily. The Committee proposed still to maintain Mr. Swallow's connection with the works by engaging him as Consulting Engineer. That gentleman had been with the Gas Company and the Corporation for 68 years, and would be willing and pleased to be able to give them any assistance in the future that they might ask him for. Mr. Wood's present salary was £300 a year; and it was proposed to raise it to £450. Mr. Charles Wood had previously been getting £150; and his salary was to be increased to £225. Mr. Holdsworth was in future to receive £150 per annum. The effect of the re-arrangement would be that there would be a saving of £225 per annum on salaries. Another special item was the proposed purchase of the premises adjoining the Valley Road gas-works. He considered that the present time was an extremely favourable opportunity for purchasing the property and ground. Every member who knew much about the gas undertaking would feel that some day or other this land must belong to the Gas Committee if the borough was going to continue to enlarge at anything like the present rate. It came within 20 feet of the gasholders, and was bounded by the present Corporation property on three sides. The price was, in his judgment, a very fair one. For the £7750 they would get an area of 5262 square yards and the buildings on it. The buildings were at present producing a rental of £350 a year; and there was a stream of water which would be worth £100 a year to the Corporation. The property therefore would return something like 2 per cent. until the Corporation required it. It would not be needed for the purposes of the Corporation for some years. The next matter which he thought it necessary to mention was the acceptance of the tenders for the supply of coal. The amount of coal which the Corporation carbonized was 150,000 tons per annum; and the prices at which the tenders came in were close upon 3s. a ton in advance of the accepted tenders of last year. It was obvious, therefore, that if they wanted the full usual quantity, they would have to pay £20,000 more for coal this year than they had done last, which sum would take away a very large proportion of their profit. But it fortunately happened that the Committee, with some amount of foresight, had so arranged matters that there were about 75,000 tons of coal still to be delivered to them under the old contracts. In the present resolution, therefore, the Committee were only asking for the acceptance of tenders for about 60,000 tons at an average extra cost of about 2s. 6d. per ton. This would leave the loss, as a consequence of the increased price of coal, at £7000. He was glad to say that he did not see any prospect of the necessity for raising the price of gas for some time to come. If at any time there should happen to be a large deficiency, in consequence of the increase in the price of coal, he hoped the Council would adopt the principle of levying a small rate as a lamp-rate for the purpose of meeting the deficiency. The Committee ought to receive at least £15,000 or £16,000 income for the lighting of the lamps; and if any difficulty occurred of the kind which he suggested, he was convinced that this would be the fairest way of meeting it. He did not, however, believe any deficiency of the sort would arise in the current year.

Mr. BARKER seconded the resolution.

Mr. WALKER remarked that Mr. Swallow was to receive in the future the sum of £500 a year; and he wished to know whether that sum would cover everything which was to be paid to him if his services were still to be retained as Consulting Engineer.

Mr. H. LISTER expressed the opinion that, in regard to this matter of the re-arrangement of the department, the Committee had not been discreet, and that they had brought the motion before the Council before it was properly matured. He thought that the mere fact of an improvement in position in the office should count for something with fMr. Wood, and that a less increase than £150 upon a previous salary of £300 would have been ample for a beginning, with the prospect of further advances in years to come. He moved, as an amendment, that the minutes should be passed with the exception of that portion of them which related to the increases of salary to Messrs. Wood, which should be referred back to the Committee.

Mr. WALKER seconded the amendment.

After some discussion on the question of the proposed salaries,

Alderman F. PRIESTMAN said Mr. Swallow was entitled to a pension of £500 a year by Act of Parliament, whether or not he came near the Town Hall. Therefore, if the Corporation chose to consult him, he presumed it would be the wish of the Council to pay him for his services. He did not suppose Mr. Swallow would often be consulted; but if it were found desirable to enlarge the Birkshall Gas-Works, the Committee would be injudicious not to take advantage of his knowledge. He hoped the amendment would be withdrawn, and that the Council would not pass a vote of censure either on the Committee or Mr. Wood. He thought the salary which Mr. Wood had consented to accept was very reasonable. He had been for ten years in their service, and had been practically occupied the position of Gas Engineer.

The amendment was lost by 26 votes to 16; and the original resolution was then carried.

BURY CORPORATION GAS SUPPLY.

The Disposal of the Gas Profits.

At the Meeting of the Bury Town Council last Thursday week—the MAYOR (Mr. C. Brierley) in the chair—a long discussion took place on the question of the disposal of the profits of the Gas Department.

The report presented by the Gas Engineer and Manager (Mr. W. H. S. Gendall) stated that in the year ended March 31 last the increase in the consumption of gas had been 9,758,450 cubic feet, or 4·14 per cent. The gas made was 261,846,000 cubic feet; sold to private consumers, 221,212,750 cubic feet; sold for public lighting, 20,793,400 cubic feet; used on works and by public clocks, 3,573,000 cubic feet. The loss through leakage, condensation, &c., was equal to 6·21 per cent., as compared with 5·22 per cent. in the year 1888-9. During the year the Lighting Committee erected 20 new lamps; making a total of 1826. The illuminating power of gas averaged 18·3 candles. Coke improved during the year upwards of 34 per cent.; and tar maintained its price. Sulphate of ammonia, however, decreased; and in this the outlook was not very promising. The cost of manufacture, distribution, and management per 1000 cubic feet of gas sold was 2s. 1·83d. Allowing for the amount received for tar (2·02d.), sulphate of ammonia (1·50d.), coke (3·36d.), and sundry meter-rents, &c. (0·91d.), 7·79d., there remained 1s. 6·04d. Adding interest on loans, stock, and sinking fund contribution, 6·75d., the net cost per 1000 cubic feet of gas sold was 2s. 0·79d. The net amount received for gas per 1000 cubic feet sold was 2s. 0·65d.; showing a loss of 0·14d. The following was the estimated cost of gas per 1000 cubic feet for the current year: Manufacture, distribution, and management, 2s. 4·29d., less tar, sulphate, coke, and sundries, 7·79d.—total 1s. 8·50d. Add interest on loans, &c., 6·75d., made 2s. 3·25d., or equal to 2s. 3¼d. per 1000 cubic feet gas sold.

The Borough Treasurer (Mr. H. Grundy) presented a report as to the disposal of the profits of the Gas Department. He contended on this that it was not legal, under the Bury Gas Act, 1857, to make good the losses of one year out of the profits of any succeeding year. He quoted the section (66) as to the disposal of the profits, as follows: "Such profit shall be applied—one moiety thereof for the purposes of the Improvement Act, and the other moiety thereof in reduction of the price of gas for the then next ensuing year, as nearly as may be corresponding to the amount of such moiety." It was clear, he added, that if the provisions of this section were carried out, the *whole* of the profit would be applied, and there could not be any "surplus," excepting a small balance that might remain of the fractions of pence which it would be practically impossible to divide among the consumers. The report continued: The whole of the income receivable from the sale of the gas at the price fixed should be carried into the revenue account as income from gas-rents; consequently the amount of profits applied in one year in reduction of the price of gas must be added to the cash actually received as gas-rents in the next following year. During the year ended March 31, 1886, the quantity of gas sold was 219,065,087 cubic feet, at 3s. 4d. per 1000 cubic feet. The revenue from this would, at 3s. 4d. per 1000 cubic feet, be £36,510 17s. In the annual statement of accounts this amount is made up thus:—

Rents of gas supplied to private consumers .	£27,417	17 0
Do. do. public lamps . . .	2,604	3 7
Moiety of profits of previous year allowed to consumers	5,437	0 11
	£35,459	1 6
The difference is the amount allowed as discount for prompt payment	1,051	15 6
Total	£36,510	17 0

I have referred to this year's accounts (March, 1886) because it is the last in which there appears a separate statement of the "Consumers' Moiety of Profit Accounts;" and the account shows a balance of £3930 15s. 2d. to be due to consumers. It has not been "applied," because it has been carried into and added to the "surplus" in the balance-sheet of next year. Since then the following profits have accrued:—

Year.	Profits.	General Rate.	Consumers.
	£ s. d.	£ s. d.	£ s. d.
March 31, 1887 ..	3,723 15 10 ..	1,861 17 11 ..	1,861 17 11
„ 1888 ..	105 10 3 ..	52 15 2 ..	52 15 1
„ 1889 ..	1,171 1 5 ..	595 10 8 ..	585 10 9
	£5,000 7 6 ..	£2,500 3 9 ..	£2,500 3 9

One moiety of the profits for these years has been paid over to the general rate, and the other moiety stands in the balance-sheet for March 31, 1889, as amount divisible among consumers. There is, therefore, now due to consumers: Amount buried in surplus fund, £3930 15s. 2d.; amount standing as a liability, £2500 3s. 9d.—total, £6430 18s. 11d. This balance cannot be applied by reducing the initial price of gas. The application of the moiety of profits is not to be by reducing the price of gas each succeeding year by the amount of such profit until there is no profit made. There was a deduction in the gas bills of the years 1886-7 and 1887-8 of 4d. per 1000 feet; but, as appears in the accounts, there was a profit made each year, and that profit has not been "applied," and is still owing to the consumers. So the effect of deducting these two fourpences was only to reduce the initial price of gas. There was no deduction as share of profits for 1888-9, nor was the price reduced; yet there was a profit which is not, as yet, "applied." The Birkenhead Improvement Act, 1881, has a clause similar to ours, as to applying the profits; but the amount of such profit which they are to receive is limited to £6000 per annum—a sum they would in a very few years be unable to obtain if the profits of each year were applied in reducing the initial price of gas. The Birkenhead Corporation follow the same plan of applying the consumers' moiety of profits as was done here to March, 1886; and it is the easiest and most equitable and convenient—*i.e.*, by deducting so much per 1000 cubic feet from the bills. I have before stated that under section 66 there cannot be any "surplus" of profits; and it appears to me a direct infraction of the Act to retain any of the consumers' profit as a surplus, and so an injustice to them.

The Gas Committee, having considered this report, determined that the amount standing to the credit of gas consumers should be applied in reduction of the price of gas of the ensuing year, in accordance with the Act, by means of a reduction of 4d. per 1000 cubic feet consumed. They also resolved to increase the price of gas from 2s. 1d. to 2s. 4d. per 1000 cubic feet, less 1d. discount for prompt payment; the charge to outside consumers to be 3s. 1d., less 1d. discount.

Alderman BURROW, in moving the confirmation of the minutes, said the increase in the price of gas would not surprise anyone who took into consideration the advance of wages and the cost of coal, in addition to the loss on the carriage of residuals. The increase would be counterbalanced by the Committee adopting the recommendations of the Borough Treasurer, disposing of the sum lying to the credit of the gas consumers on the books of the Committee.

Mr. BENTLEY, criticising the policy of the Committee, said they were evidently going back to the old system of book-keeping; and it was necessary to know whether they would now return the £200 or £300 which they obtained from the Inland Revenue authorities as overpaid income-tax, and pay in future double income-tax on the profit made. There ought not, he argued, to be any amount standing in the books as divisible among the consumers; because, as a matter of fact, up to the close of 1889 the consumers had actually obtained gas at a less price by £5000 than they were entitled to, owing to the amount of profit applied to the general rates. "The balance cannot be applied by reducing the initial price of gas," said the Borough Treasurer. There was nothing in their Act of Parliament about the "initial price of gas;" and why this bogey had been trotted out again, he could not tell. The manifest interpretation of the clause was that the Corporation (or the Commissioners of that day) were intended to be so restricted that whatever profit they made in one year should be used in reducing the price the following year; and if this were carried out literally, there could be no alternative but to gradually lower the price each year until there was no profit made. This course was adopted two years ago by the Corporation, and was working satisfactorily; and, in his opinion, it would be most unwise to change it. The consumers had no grievance. They found there was a balance due to them; but it was a mistake in book-keeping. All that balance should have been merged in the surplus, as was done in 1886. If the surplus reached such an amount that it would clear off the whole of the debt incurred in the construction of the works, the gas consumers would be delighted. They would then say: "The Gas Committee have nothing to do now but to charge us the actual price of gas. All the debt on the works is extinguished; and we shall actually get our gas at cost price." But if the resolution before them were carried, they would inflict a loss on the ratepayers to the extent of 4d. per 1000 cubic feet, because the price of gas would this year be 2s. 4d., and there would be a share of profit returned which was lying in their hands as a balance that did not exist. Every penny of that 4d. meant between £700 and £800. The Committee were actually going to supply gas at 1s. 11d. per 1000 feet, and lose £3000 on the transaction.

Alderman ASHWORTH agreed with Mr. Bentley that the Act, if properly read, meant that any profits made in any one year should be divided, as between the consumer and the ratepayer, in the following year; and if this were legally carried out, it followed that eventually there would be no profit whatever made. The surplus was not only incorrectly put in the books, but there ought to be no surplus whatever; it ought to be merged in the common fund.

Alderman MELLOR contended that an equal sum had been paid over to the rates. If they read the report of the Borough Treasurer, they would find that a sum had been set aside for three years, which had been paid to the general rate; while the other share should have gone to the consumers, out of whom the profit had been made. It was the duty of the Committee to repay to the consumers their share of the profits, as they would have to make up the loss on this year's working.

Alderman PEERS suggested that the money should be used for the extension of the works, by which all parties—consumers and ratepayers alike—would be benefited.

Other members of the Council having spoken,

Mr. BENTLEY said no one had dealt with the Inland Revenue Department. He wished to know if the Committee proposed to pay back the £200 or £300 returned for income-tax. There was great confusion in the discussion arising from using words not in the Act. The words were "as nearly as may be." In consequence of this profit, they reduced the price; and in 1888 they made only £105, £52 of which went to the general rate. Notwithstanding this small profit, they reduced the price of gas to 2s. 1d. and 2s., which made a difference of £5000 or £6000. There was no profit at all.

Alderman BURROW, in reply, maintained that there was a surplus which belonged to, and ought to have been given to, the gas consumers years gone by, amounting to £6430. It was not the profit for one year, but for several years; and they had no power to spend it in any other way. The ratepayers had had their half returned to them; but the consumers had not had theirs. They were at the mercy of the gas consumers to call upon the Committee to refund the money. If they were entitled to pay income-tax, they ought to pay like honourable men, and not get out of it by manipulating the accounts. Mr. Bentley had said that if the resolution were carried, and they paid 4d. back, it would bring the price of gas down to 1s. 11d. This was a misleading statement altogether. They would be charged 2s. 3d. per 1000 cubic feet; and 4d. would be taken off the consumers' allowance of profit out of the surplus fund. This would absorb about £4000. It would reduce their gas account; but it would not reduce the price they would have to pay for the present consumption. If this was not an equitable way, let them apply for a new Act at once. The Gas Committee had no other course but to follow their Act, and comply with its provisions. The money could not be made available for this year's working of the gas undertaking.

Mr. MAXWELL asked, supposing that there was a loss of £2000 upon the gas-works, and it came out of the general rate, would they have power to charge it to the consumers?

The TOWN CLERK said if there was a loss of £2000, the general rate would be liable for the loss; and if in the following year there was a profit of £2000, one-half would go against the rate, and the other to the gas consumers.

The resolution of the Committee was confirmed by 19 votes to 8.

SOUTHPORT CORPORATION GAS SUPPLY.

The Gas Engineer and Manager of the Southport Corporation (Mr. John Booth) has just submitted to the Gas Committee his report on the working of the undertaking in the year ending March 25.

The report begins by pointing out that the profits realized are not equal to those of the past few years, owing to the use of a better quality of coal and cannel at considerably advanced prices, and to the increase in wages resulting from the payment of extras for Sunday labour in the carbonizing department. The amount paid for coal was £4000 more than in 1888-9; the average price being about 2s. 6½d. per ton more than for that year. The Committee were spared the labour troubles experienced in many gas-works during last winter, owing to the eight-hour shift having been in operation at the Southport Gas-Works for upwards of 15 years. The request of the stokers for extra money for Sunday labour was granted by the payment of time-and-a-half between Saturday midnight and Sunday midnight. This is equal to an increased expenditure for wages of about £300 per annum. During the year, 3649 tons of cannel and 22,993 tons of coal were carbonized—being a decrease in the former of 665 tons, and an increase in the latter of 1039 tons; the net increase compared with the previous year being 374 tons. The total quantity of gas made in the year was 256,342,000 cubic feet; being an increase of 6,734,000 cubic feet, or 2·68 per cent. The average yield per ton of coal carbonized was 156 cubic feet more than in the previous year; the illuminating power being 22·09 as against 21·66 candles. The total quantity of gas sold amounted to 243,056,700 cubic feet—an increase over the previous year of 8,536,300 cubic feet, or 3·63 per cent. Of the gas sold, 216,339,400 cubic feet were registered by meters; and the consumption by public and private lamps was 26,717,300 cubic feet. The former shows an increase of 4·78 per cent.; the latter, a decrease of 4·78 per cent. The number of public lamps lighted at the end of the year was as follows: Southport, 1142 ordinary, 182 Bray's; Birkdale, 348 ordinary, 25 Bray's. The consumption of gas by the public lamps during the year was: Southport, 24,127,100 cubic feet; Birkdale, 3,451,000 cubic feet. In each case there was a decrease. The number of new service-pipes laid was 386; and the number of gas-meters in use at the end of the year was 7818—showing an increase in the latter of 299. The increase in the quantity of gas sold by meter was equal to £1500 more than in the year 1888-9. The sales of residuals during the year realized as follows: Coke, £4805; tar, £2968; sulphate of ammonia, £3490—being an increase of £2289. The net receipts from residuals were equal to 7s. 2·81d. per ton of coal carbonized—an increase of 1s. 8·65d. per ton as compared with 1888-9. The gross profit for the year amounted to £11,638 15s. 11d.; being a decrease of £1157 1s. 5d. After paying interest on loans, adding to the sinking fund, and allowing the cost of gas for street lighting, there was left a net profit of £2675 16s. 5d. Of this sum, £100 goes to the reserve fund, and the balance is applied in relief of the rates. The value of the gas consumed for street lighting is £2746 6s. 7d.; the cost of lighting extinguishing, cleaning, &c., amounts to £844 5s. 6d; making the total expenditure for the year on street lighting account £3590 12s. 1d., for which the Gas Committee has made no charge. The expenditure on capital account during the past twelve months was £2075 18s. 4d.; the total amount of this account at the end of the year being £163,513 11s. 1d. To meet the increasing demand for gas, an additional retort-bench, containing 48 through retorts, has been erected and fitted up, and is ready for work. Other extensions and alterations in the manufacturing and distributing plant are in progress and under consideration. From the quarter ending in September last, the price of gas in the Ainsdale district was reduced 6d. per 1000 cubic feet.

The Borough Surveyor of Stafford and the Water-Works.—For the extra duties which the Stafford Borough Surveyor has been called upon to perform in carrying the water-works to a satisfactory completion, the Town Council have awarded him an honorarium of £250.

The Electric Lighting Question at Canterbury.—The Canterbury Town Council, at a special meeting last Wednesday, resolved that, pending the granting and confirmation of the Provisional Order to be applied for by them, application should be made to the Board of Trade for a Licence, authorizing them to supply electricity for public and private purposes within the city.

Nottingham Corporation Water Supply—At the meeting of the Nottingham Town Council on Monday of last week, the annual report of the Water Committee was presented and adopted. It showed an increase of £866 5s. 5d. in revenue in the twelve months ending March 25 last, in comparison with 1888-9; while the working expenses were £220 8s. 5d. less than in the previous year. After paying annuities and interest on loans and consolidated stock, and making the annual contributions to the renewal fund and the different sinking funds, the ultimate balance of profits available for disposal by the Council, in aid of the rates or otherwise, amounted to £2540 1s. 4d. Mr. L. T. Godfrey, the Water Engineer, stated, in his annual report presented on the same occasion, that the whole of the machinery was in an efficient condition, and fully capable of performing with ease the demands which for some years to come are likely to be made upon it. During the past year he was able to more fully investigate the storeage capabilities and resources of the reservoirs. From an extended series of experiments, he found that, at their highest working levels, there was only, under maximum conditions of consumption, 1·39 days' supply; and at their lowest working levels under similar conditions, only 0·68 of a day's supply. Consequently, even with an average supply of water, it will be necessary, under conditions which may occur at any time during the summer months, to rely upon the pumps to a great extent. There are now 249 miles of water-mains in Nottingham, 7¼ miles of which were laid during the past year, resulting in the supply of 651 additional houses, exclusive of trade supplies. Strenuous attempts have been made to cope with the enormous waste continually going on—in many cases due to subsidences resulting from mining operations, but, to a considerable extent owing to defective fittings; and during the past year no less than 28,209 taps were re-leathered.

ELECTRIC LIGHTING FOR BARNSLEY.

The Park and Lighting Committee of the Barnsley Town Council have prepared a report on the subject of electric lighting, in which they recommend—"That the tender be accepted of the Westinghouse Electric Lighting Company for the construction of an electric lighting plant to light the area mentioned in the second schedule to the Provisional Order, subject to the terms of the tender being embodied in a contract to be prepared by the Town Clerk, and subject to the system of the Westinghouse Electric Company receiving the approval, in writing, of the Board of Trade." The inner area referred to comprises practically the whole of the business part of Barnsley; and the tender amounts to £17,800. For a year past the Committee have been considering the question of lighting the town by electricity, a Provisional Order for the purpose has been obtained, and tenders in various forms received and considered. Tenders for the execution and maintenance of all the works needed for the supply of electricity for lighting and motive purposes, were first asked for; but owing to the "high charges and excessive terms of purchase asked by the companies," the Committee were compelled "to relinquish all ideas of introducing the electric light to Barnsley by the medium of a private company." Tenders for erecting and supplying a plant requisite for the Corporation to light the inner area—practically the business centre of the town—were then asked for and obtained, as follows: The Gulcher (New) Electric Light and Power Company, Limited, £25,500; Electric Construction Corporation, Limited, two tenders, £22,751 and £21,721; Manchester Edison-Swan Company, Limited, £19,200; Westinghouse Electric Company, Limited, £17,800; Laing, Wharton, and Down Construction Syndicate, Limited, £16,975; Brush Electrical Engineering Company, Limited, £13,100; National Electric Supply Company, Limited, £11,188. The advice of Mr. A. Bromley Holmes was sought; and acting upon it, the Committee make the above recommendation. He estimates the cost of maintenance as follows: Coal, water, oil, waste, &c., £1450; renewal of carbons and street incandescents, £225; salary of chief engineer and assistant, £350; wages of enginemen, stokers, linemen, and labourers, £936; collector and clerk's assistance, £200; sundry expenses, £200—total, £3361. Interest, sinking fund, 5 per cent. on cost of site and buildings, £4000, equal to £200; 10 per cent. on cost of plant, &c. (including repairs), £18,500, equal to £1850—total annual estimated cost, £5411. Assuming all the incandescent lamps provided for in the scheme to be used at 6d. per unit, they would give a revenue of £4000, leaving £1411 to set off against the street lighting. The street lights would replace 248 gas-lamps, giving a total light of 6574 candles, at a cost of £800. The street lights proposed to be substituted for these would give a light of 54,480 candles; and extensions beyond the area would cost £50 for each arc lamp, and £10 for each 32-candle power incandescent lamp.

GAS UNDERTAKINGS IN THE COLONIES.

The Brunswick (Melbourne) Gas-Works.

We learn from a Melbourne paper lately to hand that the erection of the works of the Brunswick Gas Company is making rapid progress towards completion. The Company was incorporated on Feb. 12 last; but the foundations of the works were commenced a short time before, in order to comply with the conditions of the concession and public lighting contract granted by the Brunswick Town Council. The works are on a plot of land about three acres in extent, and have 310 feet railway frontage, which will command transit for the coal and all other materials required for the manufacture of gas, &c. The works have been designed by Mr. S. S. Hutchison, C.E., the Company's Consulting Engineer, who has retained Mr. J. Chamberlain, C.E., M.I.M.E., formerly of Beckton, and recently with the Melbourne Gas Company (whose service he left, with compensation, on account of ill-health), to supervise their erection and the placing of the machinery in position. The retort-house is a substantial brick building, 120 feet long by 70 feet wide and 30 feet high, which will be covered by a circular iron roof. The coal-stores run parallel with the railway the entire length of the building. Regenerative furnaces of the most modern character are in course of construction. The productive power of the retort-house will be 650,000 cubic feet of gas per 24 hours. Improved arrangements for the comfort of the workmen will be a special feature in these works. On the southern boundary of the site, there is a line of buildings having a frontage of 323 feet. They comprise workshops, condenser-house, sulphate works, boiler-house, engine and exhauster room, purifying-house, lime and oxide stores, lavatory, stables, and loft. A very large tar and liquor tank is being constructed. The station-meter building, governor-house, and general offices are in progress, and when completed will impart to the works a striking and finished appearance. Houses for the Superintendent and resident foreman are nearly ready. The whole of the premises will be surrounded by an iron fence. The contract for the works provides for 27 miles of mains, the laying of which has been commenced; and about 4 miles of mains were in course of delivery at the time of the latest advice. About 3000 services, 3000 consumers' meters, the purchase of the land, and all other preliminary charges are included in the contract. Some of the machinery will be made in the locality, and the imported portions will be sent out by steamer, so that the Directors confidently expect that gas will be ready for distribution in December next. The works are so situated that the Company will be able, if called upon, to supply adjacent towns.

The Thirlmere Water-Works.—The longest tunnel in connection with the Manchester Thirlmere water scheme—the Raise Tunnel, which extends from near Townhead, Grasmere, to the straining well at Thirlmere, and is 5225 yards long—was completed, so far as boring is concerned, last Wednesday night. The tunnel has been in course of construction nearly four years.

METROPOLIS WATER SUPPLY.

Deputation to the President of the Local Government Board.

Last Friday a deputation from the Metropolitan Vestries and District Boards waited upon the President of the Local Government Board (Mr. Ritchie), to urge the advisability of dealing in the present session with the subject of the water supply of the Metropolis. Mr. Ritchie was accompanied by Sir Hugh Owen; and the deputation was joined by Mr. O. V. Morgan, M.P., Professor Stuart, M.P., Mr. Causton, M.P., Mr. Bolton, M.P., and Mr. Baumann, M.P.

Mr. MORGAN, in introducing the deputation, said that if the undertakings of the London Water Companies were handed over to the County Council, there would cease to be any feeling of antagonism between the ratepayers and the suppliers of water; and if the Council or a Water Trust took over the undertakings, a saving of £300,000 a year would be effected in management and interest, which would be equal to 3d. in the pound in the rates of London.

Mr. BOLTON called attention to the effect of the quinquennial valuation of property, which, he said, would largely increase the rateable value, and enable the Water Companies to enormously increase their charges, and thus inflict a heavy burden upon the people of London.

Mr. J. BEAL said what the deputation asked the Government to do was to establish the machinery that would enable them to pass the burden of the water question from themselves to others qualified to deal with it, and having the confidence of the public—say, the Governor of the Bank of England, to represent capital; the Governor of the New River Company, to represent the interests of the water shareholders; and the Chairman of some great representative body in London, to represent the consumers. It would be an easy task to add a sufficient number of names to inspire public confidence, so that the shares in the water undertakings would not be depreciated in the slightest degree, and to give an assurance that justice was at last going to be done.

Mr. BAUMANN said it appeared to him that to fix the price of water—an article of consumption as necessary as light—not by the cost of production, not by the market value, but by a man's rent, was an anomalous, an indefensible, and an oppressive law. He urged the right hon. gentleman to give Mr. Causton's Bill a chance of being carried into law in the present session.

Mr. RITCHIE, in reply, said the question divided itself into two parts—first, whether some legislation should take place immediately with respect to the charges of the Water Companies; and, secondly, whether there should be some immediate legislation with regard to the transfer of the water supply undertakings to some public body. The first proposal again divided itself under two heads—first, whether it was practicable; and, secondly, whether it would be just. With regard to its practicability, he was astonished to hear the views of the gentlemen present as to the feasibility of passing legislation of this kind through Parliament during what remained of the present session. The Government had undertaken, with certain exceptions of a minor character, not to propose any fresh legislation of a contentious character this session; and it would come upon the House with something like dismay if the leader of the House were to announce that before rising they were to dispose of the water question. It would be quite impossible now for the Government to give any facilities to Mr. Causton's Bill, unless it were taken up as a Government question. It had been said that the legislation proposed would not be contentious; but he could hardly conceive anything much more contentious, or much more likely to create opposition, than to attempt to take away, by Act of Parliament, at the fag-end of a session, rights and privileges which, whether good or bad, had been conferred by statute.

Mr. LAYMAN: I do not think anyone would admit it. I should not, for one.

Mr. RITCHIE: Then I understand that the gentleman who has interpolated that observation would not regard it as a serious matter to take away rights conferred by statute.

Mr. LAYMAN: This is quite exceptional

Mr. RITCHIE: I dare say; but that is not my opinion at all. Whatever may be the views of gentlemen in this room, I venture to say that the large majority would regard it as a question of principle. (No, no.) All I can say is that I am at issue with those who shout "No;" and I do regard it as a serious matter of principle.

Mr. LAYMAN: Serious to those who have to pay. (Cries of "Order.")

Mr. RITCHIE (continuing) said that in 1885 Parliament passed a Bill which took away from the Water Companies the right they then possessed of increasing their assessment from time to time within the periods of quinquennial revision. They were now approaching the first revaluation after the passing of that Act; and he would therefore suggest this consideration as being an added element of difficulty to the suggestion—that they were, on the first opportunity for the exercise of the rights which were practically agreed to by Parliament in 1885, to pass a Bill saying that the Companies should not exercise those rights. It had been said with great force that, without any increased supply, the right should not be given to make an increased charge. But he imagined that the effect upon the individual would be the same if the water supply were transferred to a public authority; because the charge would be levied by means of a rate, and if a man's assessment rose, he would have to pay an additional sum, although he might not get a larger supply of water. What were the circumstances of the present day so far as the public were concerned, and with regard to the possibility—the probability, he hoped—of the supply being at some time transferred to a public body? He very greatly doubted whether the approaching re-valuation of the Metropolis would greatly benefit the Water Companies. There was a very much larger question involved in the proposal that the water should cease to be supplied by Companies (whose interests were mainly those relating to dividend), and given to a public body whose interests would be those of the general community. This principle had been fully recognized by the party to which he belonged. He entirely agreed that this was no party question; and he thought it would be a most lamentable thing if party strife were imported into municipal matters. Therefore, when he alluded to the fact that the party to which he belonged had given some evidence of their desire to move in the direction suggested, he hoped it would not be supposed that he had even hinted that the party opposed to them in politics were not equally anxious to do similar work. The Conservative Government in 1879 and 1880 gave good evidence of their desire to see the water supply of the Metropolis in the hands of some representative body. The opinion the Government held at that time they held now. The only satisfactory solution of this question was to transfer the water undertakings to a public authority. Mr. Baumann hesitated, and probably others would hesitate as to conferring such large duties and powers upon the London County Council; but, without expressing any final or absolute opinion, he thought that, having created in the Metropolis a large and important body fully representing the whole of the ratepayers, the transfer of those powers to any other body would be attended with great difficulty. His own view lay distinctly in the direction of casting the responsibility upon the London County Council when the occasion arose. As they knew, an enormous sum of money was involved; but he hoped this would not stand in the way of a complete solution of the question. He was sure there was a strong feeling in the Metropolis that the water supply of London should, upon fair and equitable terms, be transferred to a body which was representative of the ratepayers, and which would administer the undertakings solely in the interests of the public. In expressing this feeling for himself, he felt sure that he was also expressing it for his colleagues. The London County Council had this year received the sanction of the House of Commons to the devotion of a sum of money to an investigation into the question of the water supply. The Corporation of the City were also, he believed, at their own expense, inquiring into the question. He assured the deputation that the Government would be prepared to give a full, careful, and he hoped a satisfactory consideration to any suggestions, recommendations, and reports which might be made to them by those authorities.

Sir W. J. FARRER, in thanking Mr. Ritchie for his courteous reception of the deputation, observed that, looking to the fact that there was to be an autumn session, and that the new assessments would not come into operation until April next, there might be time for the Government to support them, as he hoped they would.

The deputation then withdrew.

LIVERPOOL CORPORATION WATER SUPPLY.

The Cost of the Vyrnwy Scheme—The Water Charges in Bootle.

The Police and Sanitary Regulations Committee of the House of Commons have lately had before them a Bill promoted by the Liverpool Corporation, the chief purpose of which is to make the municipal and parliamentary boundaries conterminous; but included in the Bill were two clauses referring to the water supply. By one it was proposed to give power to the Corporation to borrow a sum or sums equal to the amount paid up to the end of June, as interest on the debt incurred in carrying out the Vyrnwy scheme sanctioned by Parliament in 1880; and by the other power was sought to equalize all the water charges and conditions of supply in Bootle and Liverpool.

In regard to the first matter, the Deputy Town Clerk (Mr. Clare) gave evidence which showed that the Corporation, when they undertook the Vyrnwy scheme, anticipated that the revenue of the Water Department would go on increasing as it had done before. The Committee who considered the Bill to authorize the works, ordered that the sinking fund should begin on August 2, 1890; but this was in the belief that the works would be finished in 1886. They were, however, not yet finished; and £2,000,000 had been spent. On the other hand, the revenue had not increased to a sufficiently large extent to prevent an increase of the water charges; and it was thought that the charges which would be necessary, without the clause in the Bill, would bear hardly upon the present consumers of water, especially considering that the works were carried out with a view to future requirements, and unforeseen difficulties had delayed their completion. Their cost had also been increased by additional works having to be constructed, in consequence of the opposition of the Severn Commissioners. As a matter of fact, the water-rate of Liverpool in 1890 produced rather less than it did in 1880; and there had been an increase in the water-rents of 1¼d. in the pound. As the works were not yet finished, there had been no return from them. The proposal in the clause was really retrospective, as it referred to interest that had already been paid out of the water charges. The total sum which the Corporation would be able to borrow under the clause would be £405,000, which would effect a saving for the next fifteen years of £30,000 a year. At the expiry of that term (in 1905), the ratepayers would have repaid a considerable amount of their debts; and the Corporation therefore thought they were justified in asking the ratepayers of 1905 to pay the extra charge of £14,000 a year, which would be the result if this clause were agreed to. The Vyrnwy works were virtually complete with the exception of the tunnels under the Mersey and the Manchester Ship Canal; and the water at Vyrnwy was now running over the embankment. He might say that when the Bill was before Mr. Courtney, he thought the proposal in this clause very fair under the circumstances; but he saw difficulties in the way, and especially this—that it would set a very dangerous precedent, and he did not see how to distinguish this case from others which might be brought forward. In view of this objection, the Corporation would be satisfied if the Committee would agree to consent to postpone the commencement of the sinking fund from Aug. 2, 1890, to Aug. 2, 1895. This would practically give them £10,000 a year for the next five years. Eventually the Committee agreed to grant a clause postponing the commencement of the sinking fund for the period named; the Chairman (Mr. G. W. Hastings) remarking that they often did this for special reasons; but the other principle would lead the Committee into great difficulties.

Respecting the clause dealing with charges for water in Bootle, from the evidence adduced it appeared that in Liverpool occupiers of property paid a water-rate of 6d.; and there was also the domestic water-rental, which was not to exceed 1s. in the pound. The rent for domestic supply was 3d. more outside the borough; and there was no rate, so

that Liverpool paid 3d. more in the pound than the outside district. The proposed equalization of the charges was strenuously opposed by Bootle; but in the end, the Committee thought that the clause was a most reasonable proposal on the part of the Corporation of Liverpool, and one which was for the benefit of Bootle as well as Liverpool. In making this announcement, the Chairman observed that one could not help seeing in these days that it was very sensible to encourage large corporations like Liverpool to obtain the water supply of large areas; for it was impossible for small bodies to borrow the sum necessary. Liverpool was able to borrow four millions because its credit was high; and they were convinced that Bootle was one with Liverpool as far as its trade and prosperity was concerned. It therefore seemed to him that it was the most reasonable thing in the world that whatever tax Liverpool had on itself for water should also be borne by Bootle. The Committee therefore were unanimous that the clause ought to be passed. He, however, suggested that the Bootle Corporation should have two members on the Water Committee. On behalf of the Liverpool Corporation, this was agreed to. The representatives of Bootle said that after the Chairman's remarks, they would retire; but they would fight the matter out elsewhere, as they believed they had a good answer to the promoters' case.

Westhoughton Gas Company.—At a meeting of the Directors of this Company held last Thursday, it was decided to recommend the declaration of a dividend of 5 per cent. on the half-year's working; leaving a substantial balance to be carried forward. This is the largest dividend which has been paid by the Company for many years, and is ½ per cent more than was declared for the previous six months.

Entertainments to Gas Workmen.—Last Wednesday the employees of the Dover Gas Company with their wives and families had a day's trip to Sheerness. They were accompanied by the Directors, who dined at the Royal Hotel; the men and their families being entertained at the Royal Victoria Hall. On Saturday the men employed at the Ramsgate Corporation Gas-Works had their annual outing and dinner. They were accompanied by the Engineer (Mr. W. A. Valon); and a pleasant day was spent.

The Inquiry into the Water Supply of London.—The Water Inquiry Committee appointed by the Corporation of London resumed its sittings at the Guildhall last Friday under the presidency of Sir Guyer Hunter, K.C.M.G., M.P. The City Chamberlain (Mr. B. Scott) gave some statistical evidence supplementing that given by him on the first days of the inquiry; and Mr. Jabez Hogg, M.R.C.S., was recalled on the general question as to the quality of the water. Mr. Alderman Cowan spoke in favour of a supply by measure; and Mr. G. Webster, an Australian merchant, who has made some experimental borings in the Colne Valley and elsewhere in the north of Middlesex, offered to supply 10 million gallons of water to London daily, being about two gallons per head per day. He was requested to commit his proposition to writing, and give an estimate of the cost. The Committee then adjourned till Friday next.

The Lancashire Coal Trade.—Business in the coal trade continues steady, and prices all round are well maintained. The anticipated rise in the price of coal at the end of this month, which is likely to be consequent upon the further advance in colliers' wages, has given the market a slightly firmer tone, which is sure to improve. House coals have been in better request; and move off more freely than was the case last week; the result being that more than the usual amount of business has been done in this line. Best coal averages at the pit mouth 11s. to 11s. 6d.; second qualities, 9s. 6d. to 10s.; and commoner sorts, 8s. 6d. to 9s. per ton. The lower kinds of round coal for steam and iron-making purposes are obtainable at a slight concession, owing to the indifferent demand. A fair class of coal in this line can be bought readily at the pits from 8s. to 8s. 6d. per ton. Steam coal for shipment is quoted at 9s. 6d. per ton delivered on the Mersey; better qualities range from 6d. to 9d. per ton more. There is plenty of slack on the market, and the tendency is in the buyers' favour. Fair descriptions of burgy fetch 7s. 6d. to 7s. 9d. per ton at the pits; the better grades of slack, 6s. 9d. to 7s. 3d.; commoner sorts, 6s. 6d. per ton. Ordinary descriptions of coke move off slowly at 14s. to 16s. per ton; and best foundry coke averages 18s. 6d., although in many instances 6d. per ton less is accepted.

The Richmond Well.—The well in the Terrace Gardens, Richmond, for the extension of which the Vestry have, as stated in the JOURNAL last week, decided to obtain a further sum of £2000 from the Public Works Loan Commissioners, is just beginning to show signs of repaying the money and efforts that have been expended on it. On Thursday evening following the meeting of the Vestry at which this decision was come to, a fissure was struck, by means of one of the adits, which promises to yield water at the rate of about 100,000 gallons a day. The importance of this will be appreciated when it is remembered that 1s. per 1000 gallons is being paid by the ratepayers of Richmond for a large part of the water consumed in the town. The adit in question is the one referred to at the Vestry meeting as being the most promising. It had then been carried 76 feet from the centre of the boring; and on being continued to 82 feet, a large fissure was entered. The water rushed out in such volume that the workmen engaged in the gallery precipitately fled; but soon returned, and proceeded to open the fissure all round. This lessened the pressure, and the water came out at a more moderate rate. From 7.30 p.m. to midnight 18,500 gallons were obtained; giving an average of about 4000 gallons per hour, or nearly 100,000 gallons per day. Before this unlooked-for addition, there was a total yield of about 120,000 gallons per day, principally from a stratum of yellow sand; so that the total supply from the well at present is 220,000 gallons daily—nearly half the amount needed by the inhabitants for domestic purposes. The striking of this fissure is likely to attract some notice from geological scientists, as the probability of finding water in chalk under clay has been much discredited. It was believed by some that the clay and sand above would press the chalk to such an extent that there would be no possibility of water finding its way through. To come across so productive a fissure at such a comparatively early stage in the driving of the adit is regarded as very encouraging, and even better results are confidently hoped for.

NOTES FROM SCOTLAND.

From our Edinburgh Correspondent.

EDINBURGH, *Saturday*.

The Aberdeen Town Council on Monday had the question of the coal contracts before them in two different ways, and on the latter occasion they landed in a muddle over it. The first occasion arose on the minutes of the Gas Committee, in moving the adoption of which Mr. Collie, the Convenor, stated that had they delayed concluding their coal contracts, they would have suffered a loss of £2400. One of the members asked proof of this statement; but unfortunately the Lord Provost ruled that the statement itself was not altogether in order, and that any further information on the subject must be elicited by question. No questions were asked. At a later stage of the meeting, a motion was made to the effect that "in future all tenders for the supply of materials or work be opened in the presence of the Committee in charge of the matter to which the offers relate, and that the prices or rates of the tenders be inserted in the minutes." The previous question was moved by Mr. Collie, who said there was no doubt the motion was the outcome of what took place at the last meeting of the Gas Committee, and he did not know any objection to the course which was then pursued. Mr. Cook, in seconding, said he agreed that the total cost of a contract should be stated, but not the detailed prices or rates, which should only be given in committee. The Gas Committee, in what they did, were simply anxious to expedite business, because it took four weeks for investigation, analysis, and the like, in connection with the gas coal contracts, before it was possible for the Committee to grapple with them. Were they to delay opening the tenders for coal, it might lead to a very serious loss to the public. Thereafter several motions or suggestions were made; and when the Council proceeded to take the vote, they were in such confusion that neither the Councillors themselves nor their Clerk could extricate them. There was a great deal of wrangling over the way in which the question was to be put to the vote; and at last it was resolved to abandon all that had been done, and to take up the subject a fortnight hence as if it had never been before them.

The sixtieth annual report of the Kirkcaldy Gaslight Company states that the extraordinary expenditure during the past year was £48 8s. 2d. The value of cooking stoves, fires, &c., in stock was reduced by sales to the amount of £22 8s. 2d. The mains of the Company now extend to 29 miles 1619 yards. The output of gas was 64,845,600 cubic feet, an increase on the previous year's output of 583,900 cubic feet. There was a net profit of £3495 11s. 1d.; and out of that it is proposed to pay a dividend at the rate of 7s. 6d. per share, and to carry the balance of £739 11s. 1d. to the depreciation fund. In consequence of the rise in the price of gas coals, it is proposed to increase the price of gas from 3s. 1½d. to 3s. 4d. per 1000 cubic feet.

The annual report of the Portobello Gaslight Company states that £5125 3s. 2d. has been expended on capital account. The total income amounted to £6361 12s. 10d., and expenditure to £4023 8s. 11d., leaving a balance of £2338 3s. 11d. From this there falls to be deducted the interest paid on bonds, amounting to £39 5s. 4d., the sum of £37 14s. 1d., written off for bad debts, and the cost of forming the Company, amounting to £130 11s. 4d.—leaving £2130 13s. 2d. net profit. A dividend of 8 per cent. is proposed on the capital stock of £17,500, and the same for eight months on the new issue of £2500, amounting in all to £1533 6s. 8d.; and carrying £320 2s. 8d. to the depreciation fund, and £407 15s. 2d. to reserve.

This is the season for annual meetings of Gas Companies. This week the following are reported: At Brechin, with a consumption of between 18 and 19 million cubic feet of gas at 4s. 1½d. per 1000 cubic feet, a dividend at the rate of 35s. per £10 share has ben paid, and the price of gas maintained the same. At Alyth, a dividend of 6 per cent. upon a capital of £3000 has been paid, and the price of gas raised from 5s. 10d. to 6s. 3d. per 1000 cubic feet. At Crieff, a dividend and bonus equal to 10 per cent., and the price of gas was maintained at 4s. 7½d. At Markinch, a dividend at the rate of 10 per cent. has been paid, and the price of gas maintained at 5s. per 1000 cubic feet. The works are to be enlarged and improved during this season. At Banff, a dividend equal to 6 per cent., with a bonus of 2s. per share, has been paid; and the price of gas has been maintained at 6s. 3d. per 1000 cubic feet. The gas-works are to be improved during the season. At Stow, a dividend at the rate of 5 per cent. has been declared, and the price of gas maintained at the high figure of 7s. 1d. per 1000 cubic feet.

The rise in the price of cannel is matter of congratulation to coal-owners. In the annual report of the Niddrie and Benhar Coal Company, the following passage occurs: "The latter portion of the past year has witnessed a material improvement on the prices of all kinds of coal, and contracts for the supply of gas coal for the current year have been made at prices which will yield a very satisfactory profit. So far, however, as the past year is concerned, the old contracts for gas coal, made at very low prices—and which even yet have not entirely run off—have prevented the Company reaping the benefit of the improved prices to anything like the full extent, while the increased charges consequent on the rise on miners' wages and on the price of material, &c., have had immediate effect."

In Dundee on Tuesday, 83¾ shares of the Carnoustie Gaslight Company, of the value of £1 5s. each, were sold for £1 12s. each; and 50 shares of the same Company were sold for £1 11s. each. On the same occasion, 30 £1 shares of the Newport (Dundee) Gaslight Company were sold for 18s 3d., each, and 8 at 18s. each.

From our Glasgow Correspondent.

GLASGOW, *Saturday*.

According to one of the local papers, the Glasgow Corporation Gas Committee "are on the horns of a dilemma." At a late meeting of that body a minute was passed, which was subsequently approved of by the Town Council, to the effect that henceforth the workmen employed at the various Corporation gas-works should be required to give fourteen days' notice before leaving the service of the Corporation. Now, the men have refused to accept such an arrangement; and at a meeting which they held this week, they have demanded the withdrawal of the notice, failing which a cessation of labour will take place.

The local paper referred to says: "The Committee had better decide to face this difficulty at once, else it is certain to crop up again at a less convenient season. It is absurd that the lighting of the city should be at the mercy of any little grievance that may crop up, or that the Corporation should be concussed into a possible injustice to the ratepayers. The public service must be governed by the reasonable regulations recognized in all relations between employer and employee. On grounds alike of ethics and of convenience, a proper period of notice must be enforced." It has since transpired that the Town Clerk has officially requested a deputation from the men to meet in conference with the Gas Committee with a view to the settlement of the dispute. The Executive Committee of the Glasgow Gas-Workers' Union have agreed to comply with the request, and six of the men have been told off to meet the Gas Committee early in the ensuing week.

At the annual meeting of the Hawick Gas Company on the 4th inst., the Chairman (Mr. Laidlaw, of Sillerbithall) made an interesting speech in submitting the report of the Directors, the chief features of which I gave in my "Notes" a fortnight ago. He said the profits for the past year were higher than he expected—£1442 17s. 6d., or £166 16s. 2d. more than those of the preceding year. They had then taken from the second reserve fund £298 8s. 8d. to make up the dividend of £1575: while in the past year they only required to take £132 2s. 6d. The Directors had resolved, notwithstanding the large advance in the price of coals, to continue the charge for gas at the low figure of 3s. 1½d. per 1000 cubic feet; and that the illuminating power should be kept up during the year at the high standard of 30 candles. He had not heard of a single town in Scotland where gas of this quality was being sold at so low a figure; and in few, indeed, would it be possible to keep the price the same as last year. Referring to the excellent condition of the works, he said that the Manager (Mr. J. Smith) deserved the greatest credit for the manner in which he had conducted them; and which enabled them to produce such cheap gas. As to the acquisition of the Company's works, which had been often talked of by their worthy and energetic Town Council, he said that, notwithstanding their experience and talent, he questioned if they could make gas as cheaply as the Company had all along been doing. By way of comparison, he took the present position of places like Dundee, Aberdeen, and Edinburgh, whose gas-works are in the hands of the Corporations, and contrasted them with Hawick. These were, he said, only instances of the many that might be mentioned as a proof that private companies were more economically and better managed than gas corporations. The Town Council of Hawick had had under their consideration the adoption of the electric light in the burgh; and the Directors of the Gas Company, thinking that, if it was wanted for the town, they could do the work as cheaply and efficiently as anyone else, obtained estimates from a number of electrical firms, one of which stated that a town like theirs, with 25,000 inhabitants, would cost £100,000 to light with electricity. Did anyone of his auditors think that such an amount of capital could be raised in Hawick for such a purpose? Why, the entire valuation of their gas-works at present was only £26,411 18s. 4d. With such facts before them, need any of them fear the electric light? He most emphatically said it would not pay with such an outlay; in his opinion, it would be a very long time before it would pay. Up to the present time the electric light had interfered but little with the consumption of gas. Oil-gas had had a brief existence. It had been tried and found wanting as a competitor with coal gas; and the water-gas bubble had already burst. In face of these facts, he hardly thought it likely that any of the shareholders would invest money, either in water gas, oil gas, or electric lighting shares, but would continue their patronage to, and investment in, the Hawick Gas Company, the future of which would, he felt sure, be as successful as the past had been.

The annual general meeting of the shareholders of the Ayr Gas Company was held last week. In the absence of Mr. C. G. Shaw, Chairman of the Company, Mr. W. B. Cuthbertson, Deputy-Chairman, presided. In the annual report by the Directors, it was stated that the purifiers, which were erected in 1868, had become inadequate for the largely increased manufacture of gas, in consequence of which it had been found necessary to have four new purifiers, with fittings and roof, erected at the works, the contract for which had been placed with Messrs. W. Brodie & Co., of Paisley, at the price of £1150. Their construction was well forward; and when they had been completed and the annual repairs were finished, which were now in progress, the whole works will be in efficient order. The gas during the past year had an average illuminating power of 26·3 standard candles. While having pleasure in reporting that the prosperity of the Company still continued, the Directors regretted that they were precluded by the uncertainty of the coal market from recommending at present either a further reduction in the price of gas or a further dividend to the shareholders. The dividend recommended was 6 per cent.—the same as last year; and it was agreed to maintain the price of gas at 4s. 2d per 1000 cubic feet. In the two years preceding the price was 4s. 7d. per 1000 feet; and four years ago it was 5s. As the Ayr Gas Company is a very Conservative concern, I am unable to say what the make or the consumption of gas was during the year 1889-90. I am not honoured by the receipt of a copy of the annual report; but in that respect I am no better off than one of the Ayr newspapers. Another one, however, was supplied with a copy of the Directors' report, but not with a copy of the financial statement. Why such a condition of things should rule in Ayr, I am at a loss to know.

At Irvine, which is in the same county, and only a very short distance from Ayr, the Directors of the Gas Company display a more liberal spirit in the way of allowing their affairs to become known to the outside public—and not to the shareholders alone, as in Ayr. They were able to show in their report that there had been a very considerable increase in the year's consumption of gas; and that there was a sum of £1324 10s. 7d. available for dividend, which they recommended should be 10 per cent., as against 6 per cent. at Ayr. That would leave a sum of £531 19s. 3d. to add to the reserve fund, which now amounts to £2531 19s. 3d. In accordance with the recommendation of the Directors, the dividend was fixed at 10 per cent.; and it was agreed to continue the price of gas at 3s. 9d. per 1000 feet, against 4s. 2d. at Ayr. The retiring Directors and ex-Provost Paterson, the Chairman of the Company, were re-elected. While submitting the Directors' report for the approval of the shareholders, the Chairman mentioned the interesting fact that the town's old gas-works had been erected in the year 1828 by Mr. James Beaumont Neilson, famous as the inventor of the hot blast in iron-smelting, and who was at the time the Engineer to the Glasgow Gaslight Company. On the recommendation of the Chairman, the Directors have agreed to consider the advisability of erecting a new gasholder. This will be the fifth year at least for the price of gas at Irvine to be 3s. 9d. per 1000 feet.

Mr. John Lindsay, who has for some time been employed as Surveyor under the Kilmarnock Corporation Gas Commissioners has been appointed to the post of Manager of the gas-works at Girvan, in South Ayrshire, in succession to Mr. Hugh Blair. Yesterday week a meeting of his fellow-employees was held at the Kilmarnock Gas-Works to wish him success in his new position; and in their name, Mr. Fairweather, the Manager, who presided, made him two handsome presents (one for himself and the other for his wife), as a remembrance of the regard and best wishes of the friends who knew him most intimately. Mr. Fairweather, congratulating Mr. Lindsay on his appointment, expressed regret at losing him, but yet pleasure at his advancement.

The Greenock Corporation gas supply undertaking seems to have been very successful during the past year. From the statement of income and expenditure in connection with the undertaking which has just been made up, it is stated on the authority of Bailie Erskine, the Convener of the Gas Committee, that there is a balance to the good amounting to £3456 12s. 8d., which is said to be the largest yet known since the gas supply of the town passed into the hands of the Police Board. This surplus, it should be mentioned, has been made during the year in face of the fact that a reduction of 2½d. per 1000 feet of gas was made at the beginning of the financial year. Considering the fact that the price of coals has so very greatly advanced, and that there is an additional expenditure for workmen's wages, it is deemed very probable that no reduction in the selling price of gas, which is 3s. 9d. per 1000 cubic feet, but without any charge for meter hire, will be made this year.

In Stirling, as in Ayr, very little information is given regarding the affairs of the local gas supply undertaking to those gas consumers who are not also shareholders in the Gas Company. The annual meeting of the Company was held last Tuesday; but practically no information of general or special interest has been allowed to get into the local papers. No representatives from them were asked to attend the annual meeting, and the report which is presented to the shareholders is not permitted to appear in the papers, either in full or in abstract. We are told that a dividend of 7s. per share was declared, being the same rate as in the preceding year, and that certain gentlemen, were elected Directors and Auditors. It was stated that the tank for a new holder was making fair progress, considering the inclement weather, and that it was hoped the holder when completed would enable the Directors to cope with the increasing consumption of gas! According to the "Statistical Report of the Gas Supply of Scotland," the annual manufacture of gas was 49,000,000 feet in 1886; the same in 1887; 50,000,000 feet in 1888; and 56,675,000 feet in 1889; but what the make or the consumption amounted to in the financial year 1889-90 is to me and the general consumers of gas in Stirling an unknown quantity. Nor am I able to say what the dividend per cent. to the shareholders is; it being only stated that it is 7s. per share. Surely, there is no need for all this mystery. If any of the Town Councillors wish to take action for the acquisition of the undertaking, they will soon find ways and means of getting hold of all the data that are absolutely necessary to enable them to form something like an estimate of the value to be placed on the works, plant, goodwill, &c.

This week's "Notes" have already extended to such a length that it will be necessary for me to leave my promise unfulfilled for the present in respect of the coals purchased last week for the Glasgow Gas Commissioners. The subject will "keep."

The Glasgow pig-iron market has been very quiet this week, so far as Scotch and hematite warrants are concerned. On Monday, Scotch warrants were quoted at 45s. 7½d. per ton, and the price on Thursday was 44s. 11d., improving to 45s. 1½d. yesterday. In respect of Cleveland warrants, however, the market has been entirely disorganized by an attempt to corner the "bears." The price at one time was up at 46s. per ton, but yesterday there were sellers at 42s. 4½d. for delivery on Monday.

No material change has taken place in the condition of the local coal trade; but in some instances prices are just a little easier than they were a week ago. Splint is quoted at 9s. to 9s. 3d. per ton f.o.b.; main coal, at 8s. 9d.; ell, at 9s. 6d. to 10s.; and steam coal, at 10s. 9d. to 11s. 3d. per ton.

A local report of the sulphate of ammonia market for the week ending July 12 says: This market opened firm, with buyers at £11 10s. f.o.b. Leith; but about the middle of the week a slight relapse took place, and prices declined a little. For forward delivery there is no change—makers' ideas still keeping up.

The Proposed Purchase of the Oxford Gas-Works by the Corporation.—The Oxford Corporation Bill, which, as introduced, contained clauses to authorize the purchase of the undertaking of the Oxford Gas Company, was passed by the House of Commons Committee on Police and Sanitary Regulations Bills last week. The portion of the Bill relating to the purchase has been withdrawn.

Proposed Representation of Labour on the Magisterial Bench.—At a public meeting, held under the auspices of the Gas Workers' Union, in the Market Square, Norwich, on Sunday, the 6th inst., to condemn the conduct of the Directors and Managers of the British Gaslight Company in reference to their proceedings against the four men recently charged with intimidating their workmen (*ante*, p. 93), the following resolution was passed: "That this mass meeting of the citizens of Norwich considers it is unjust that only large employers of labour should be entitled to act as Magistrates in labour disputes; protests against the exclusion of working men from the magisterial bench, and calls upon the Norwich Town Council to take up the question, and get the appointment of at least three workmen on the Bench."

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *July* 12.

Sulphate of Ammonia.—The market maintains its strong tone, and prices have improved generally. London quotations have been advanced; and at Hull, business is reported at £11 10s. Similar rates have been realized at Liverpool; but at Leith, prices have been somewhat irregular. The latter circumstance may be explained by the fact that the Scotch port has been an arena for speculative dealings, which, however, will presently find their level. The position on the whole is a favourable one. The stocks everywhere are small; and the demand is fully equal to the small production at this season of the year. Germany may be a little laggard—principally because the orders are in dealers' hands; but France, Belgium, and Spain are on the *qui vive*, and increased requirements must unavoidably force prices to a higher shelf. The improved state of the nitrate market will prevent the latter commodity being used as an argument for the decline of sulphate prices; while a further advance in nitrate values cannot fail to awaken a speculative buying movement in sulphate. All this is already foreshadowed by the increased prices paid for forward contracts, of which, however, very few have been offered. Judging from inquiries, America is likely to be a regular customer for some time to come.

LONDON, *July* 12.

Tar Products.—The market is languid. Benzoles are quoted 3s. 10½d. and 2s. 10d. for 90's and 50's respectively. Business in anthracene is reported at 1s. 6d. for a considerable quantity. Crude carbolic acid is firmer, owing to the increasing value of crystals. Creosote and other products remain unchanged; but there is a good outlook for pitch, in view of the future of coal.

Sulphate of Ammonia.—The market has decidedly improved; £11 12s. 6d. being the value for prompt delivery, and makers are unwilling to commit themselves to this price far forward.

Sale of Shares in the New River Company.—At the Auction Mart last Wednesday, Messrs. Edwin Fox and Bousfield sold an entire King's freehold share in the New River Company, in lots, at prices ranging from £90,000 to £94,800 per share. They also sold £100 fully paid new shares at £370 to £374 each, *ex div.*

Extensions at the Douglas (Isle of Man) Gas-Works.—The new retort-house at these works was successfully put in operation last week. The structure is a stage-floor house, built of native stone, with red sandstone facings, and contains 140 retorts heated by generator furnaces. In addition to the retort-house, ample coal-stores are erected alongside. The contractors were: For the masonry, Mr. Creer, of Douglas; for the structural iron-work, Messrs. Clayton, Son, and Co., Limited, of Leeds; for the retort mountings, Messrs. Clapham Bros., of Keighley; for the bench work and chimney, Messrs. Mobberley and Perry, of Stourbridge—the sub-contractors for these latter being Messrs. Jonas Drake and Son, of Halifax. Mr. T. Newbigging, C.E., is the Engineer.

Gas Exhibition at Godalming.—An interesting exhibition of gas appliances, was held last week in the Public Hall, Godalming, under the auspices of the Godalming Gas Company. The exhibits were furnished by Messrs. T. Fletcher and Co., of Warrington, and included numerous patterns of washers, dryers, hot plates, grillers, and cooking apparatus. Perhaps the most interesting were the various makes of cooking-ranges arranged around the room, which the Company were prepared to let out on hire. Lectures were given by Mrs. H. David twice daily, on high-class and ordinary domestic cookery. The exhibition was opened by the Mayor (Mr. E. Gammon) yesterday week, and closed on Friday evening; having been well attended throughout. The arrangements were under the supervision of the Company's Manager (Mr. S. Bark).

The Northern Coal Trade.—The steam coal trade is steady, and best Northumbrian steam coal is quoted at 13s. per ton free on board, with full demand at all the collieries. For second qualities, the condition of the trade is more variable; and the price is, on the whole, a little easier. Steam small is quiet, at about 6s. to 6s. 6d. per ton free on board. There is a little better local demand for gas coal; and it is evident that some of the collieries are now shipping more to the great gas companies in the South, as the output is well taken up. The price varies more for gas coal; but about 12s. 6d. per ton free on board may be taken as the top price for best coal—other qualities varying downward. It is said that a contract has been signed for a south-country supply over a year, at about 11s. 9d. to 12s. per ton free on board. There is very little change in the demand for manufacturing coal; but household seems duller—the inquiry being limited and the price weak. For coke, the demand is a bit brisker, at about 18s. 6d. net for blast-furnace qualities, free on board in the Tyne. For gas coke, the inquiry is steady, and the price does not vary.

The Pontypool Gas and Water Company and their Reservoir.—In the Queen's Bench Division of the High Court of Justice last Thursday, before Baron Pollock and Mr. Justice A. L. Smith, sitting as a Divisional Court, Mr. Ruegg moved *ex parte* on behalf of Mr. John Williams, formerly of Pontypool, for a *mandamus* directed to the Justices of Pontypool, commanding them to issue a summons against the Pontypool Gas and Water Company for the purpose of enforcing certain penalties which the Company have incurred under their Act of Parliament. The learned Counsel said the Company was formed with the object of making a reservoir for supplying water to Pontypool. He had a letter from the Board of Trade, dated the 28th of June last, stating that they had not up to then certified the reservoir as constructed. There had been litigation going on for a considerable time. So long ago as 1879 Mr. Williams applied for a summons against the Company; but this was refused for want of jurisdiction—the Justices alleging that the applicant was out of time; but they offered to state a case. Mr. Williams, however, was advised to bring an action against the Company; and the matter had gone through the various Courts up to the House of Lords, and he was beaten all through. The judgment of the House of Lords, however, was mainly to the effect that Mr. Williams had taken the wrong course, and that he ought to have proceeded by summons for penalties. The Court granted a rule *nisi*.

Increase in the Price of Gas at Crays.—The Crays Gas Company have notified their intention of raising the price of gas 4d. per 1000 cubic feet.

Erratum.—By some misunderstanding, it was reported in last week's JOURNAL that an accident had occurred to two men, on the previous Friday afternoon, while working on a scaffold at the Rochdale Road works of the Manchester Corporation. The paragraph should have referred to the Rochdale Corporation Gas-Works.

The Price of Gas in Salford Out-Districts.—At the monthly meeting of the Eccles Local Board yesterday week, the Clerk (Mr. J. Trenbath) reported that he had addressed a further letter to the Town Clerk of Salford on the question of the abolition of the differential rate charged to consumers of gas outside the borough, urging that the representatives of the local authorities within the gas-supply area desired an interview with the Gas Committee, which was refused in November last. He had received a reply from the Town Clerk, stating that the General Gas Committee, having regard to a resolution passed by them on March 20 last, could not see their way to re-open the question, unless new matter could be advanced upon the subject, in which case the Committee would be glad to receive a deputation.

Sowerby Bridge Local Board Gas Affairs.—The Sowerby Bridge Local Board last year decided to make an arrangement for all their stokers to enter into an engagement for twelve months, excepting those taken on for the winter, who were to be engaged for the season required. At the last monthly meeting of the Board, Mr. Baxendale, on the Gas Committee's minutes coming up for confirmation, said he understood that this year nothing had been done in regard to this matter; and he asked that the subject should be taken into consideration. Mr. Wood remarked that the Committee had thought it wise to let it alone. The Chairman (Mr. Mark Wilcock), while in favour of the men entering into some sort of agreement, said it appeared to be rather a delicate matter to induce them to do so. Mr. Baxendale pointed out that the Board paid their stokers the very best terms; and the fact of their objecting to an agreement seemed to him extremely strange, if not, to a certain extent, suspicious. The Board did not want any annoyance arising in the middle of the winter; and by taking the precaution he suggested, they would avoid it. The subject then dropped.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For Stock Market Intelligence, see ante, p. 130.)

Issue.	Share	When ex-Dividend.	Dividend or Div. & Bonus.	NAME.	Paid per Share.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.				£ s. d.
590,000	10	16 Apr.	10½	Alliance & Dublin 10 p. c.	10	17—18	..	5 16 8
100,000	10	,,	7½	Do. 7 p. c.	10	12½—13½	..	5 11 1
300,000	100	1 July	5	Australian (Sydney) 5 % Deb.	100	107–109[*]	..	4 11 9
100,000	20	30 May	8	Bahia, Limited	20	19—21	..	7 12 4
200,000	5	15 May	7½	Bombay, Limited	5	7—7½	–¼	5 0 0
40,000	5	,,	7½	Do. New	4	5—5½	+¼	5 9 1
380,000	Stck.	27 Feb.	12½	Brentford Consolidated	100	218—223	..	5 9 10
125,000	,,	,,	9½	Do. New	100	160—165	..	5 12 2[*]
220,000	20	13 Mar.	11	Brighton & Hove Original	20	40—42	..	5 4 9
320,000	20	28 Mar.	11½	British.	20	4½—45	..	5 0 0
50,000	10	13 Mar.	11	Bromley, Ordinary 10 p. c.	10	18—20	..	5 10 0
39,000	10	,,	8	Do. 7 p. c.	10	13—14	..	5 14 3
328,750	10	13 June	8	Buenos Ayres (New) Limited	10	13—14	..	5 14 3
200,000	100	1 July	6	Do. 6 p. c. Deb.	100	103–106[*]	..	5 13 2
150,000	20	27 Feb.	8	Cagliari, Limited	20	25—27	..	5 18 4
550,000	Stck.	16 Apr.	13½	Commercial, Old Stock	100	252—257	..	5 7 0
130,000	,,	,,	10½	Do. New do.	100	203—208	..	5 3 4
130,000	,,	27 June	4½	Do. 4½ p. c. Deb. do.	100	117–122[*]	..	3 13 9
557,320	20	13 June	13	Continental Union, Limited	20	47—49	..	5 6 2
242,680	20	,,	13	Do. New '69 & '72	14	33—35	..	5 4 0
200,000	20	,,	10	Do. 7 p. c. Pref.	20	38—40	..	5 0 0
75,000	Stck.	28 Mar.	10	Crystal Palace District	100	195—203	..	4 17 7
234,060	10	30 Jan.	13	European, Limited	10	28—30	..	4 6 8
120,000	10	,,	13	Do. New	7½	19—21	..	4 12 10
354,060	10	,,	13	Do. do.	5	13½—14½	..	4 9 9
5,470,620	Stck.	13 Feb.	13½	Gaslight & Coke, A, Ordinary	100	244—248	–4½	5 10 10
100,000	,,	,,	4	Do. B, 4 p. c. max.	100	100—103	..	3 17 8
665,000	,,	,,	10	Do. C, D, & E, 10 p.c. Pf.	100	253—258	..	3 17 6
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	100	121—125	..	4 0 0
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	100	180—185	..	4 1 1
1,300,000	,,	,,	7	Do. H, 7 p. c. max.	100	164—168	+1	4 3 4
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	100	253—258	..	3 17 6
1,061,150	,,	13 June	4	Do. 4 p. c. Deb. Stk.	100	115—120	..	3 6 8
294,850	,,	,,	4½	Do. 4½ p. c. do.	100	123—128	..	3 10 4
650,000	,,	,,	6	Do. 6 p. c. do.	100	163—168	..	3 11 5
3,800,000	Stck.	15 May	12	Imperial Continental	100	216—220	–2½	5 9 1
75,000	5	13 June	6	Malta & Mediterranean, Ltd.	5	5—5¼	..	5 9 1
560,000	100	1 Apr.	5	Met. of Melbourne, 5 p. c. Deb.	100	113—114	..	4 7 9
541,920	20	13 June	5	Monte Video, Limited	20	20—21	–½	6 3 9
156,000	5	30 May	10	Oriental, Limited	5	8½—9	..	5 11 1
60,000	5	28 Mar.	7	Ottoman, Limited	5	5½—6	..	5 16 8
166,870	10	26 July	4	Pará Limited	10	4—5	..	8 0 0
420,000	100	2 May	6	People's Gas of Chicago— 1st Mtg. Bds.	100	98—102	..	5 17 8
500,000	100	2 Dec.	6	2nd Do.	100	95—100	..	6 0 0
150,000	10	16 Apr.	10	San Paulo, Limited	10	14—15	–1	6 13 4
500,000	Stck.	27 Feb.	13½	South Metropolitan, A Stock	100	290—300	..	4 8 4
1,350,000	,,	,,	11½	Do. B do.	100	235—240	..	4 15 10
141,500	,,	,,	12	Do. C do.	100	247—252	..	4 15 3
650,000	,,	27 June	5	Do. 5 p. c. Deb. Stk.	100	140–145[*]	..	3 9 0
60,000	5	27 Feb.	11½	Tottenham & Edm'nton, Orig.	5	11—13	..	4 8 5
				WATER COMPANIES.				
728,446	Stck.	13 June	9½	Chelsea, Ordinary	100	265—270	..	3 10 4
1,720,560	Stck.	16 Apr.	7½	East London, Ordinary	100	213—218	–1½	3 8 10
544,440	,,	27 June	4½	Do. 4½ p. c. Deb. Stk.	100	142–147[*]	..	3 1 2
700,000	50	13 June	9	Grand Junction	50	122—126	..	3 11
708,000	Stck.	13 Feb.	10½	Kent	100	275—280	..	3 15
1,043,800	100	27 June	9½	Lambeth, 10 p. c. max.	100	250–255[*]	..	3 14
406,200	100	,,	7½	Do. 7½ p. c. max.	100	197–202[*]	..	3 14
200,000	Stck.	28 Mar.	4	Do. 4 p. c. Deb. Stk.	100	122—126	..	3 3 6
500,000	100	13 Feb.	12½	New River, New Shares	100	367—372	..	3 5 2
1,000,000	Stck.	30 Jan.	4	Do. 4 p. c. Deb. Stk	100	127—130	..	3 1 6
902,300	Stck.	13 June	6	S'thwk & V'xhall, 10 p. c. max.	100	170—174	..	3 9 0
126,500	100	,,	6	Do. 7½ p. c. do.	100	158—163	..	3 13 7
1,155,066	Stck	13 June	10	West Middlesex.	100	265—270	..	3 14 1

[*] Ex. div.

Walker's New Purifying Machinery for the Glasgow Gas-Works.—The Glasgow Corporation Gas Committee have ordered one of Messrs. C. and W. Walker's new patent purifying machines for purifying 4 million cubic feet of gas per 24 hours. It will be 12 feet square, similar in dimensions to that which was supplied to the Melbourne Gas-Works (described and illustrated in the JOURNAL last January), which was for 3 million cubic feet of gas per 24 hours. The machine for the Glasgow Corporation Gas Committee is guaranteed for the purification of 4 million cubic feet of gas per 24 hours; and for this purpose is raised in height proportionately in excess of the Melbourne machine.

Annual Outings of the Liverpool Gas Company's Employees.—The annual excursions of the Liverpool Gas Company's employees have recently been held. In order that the whole of the men should have the opportunity of having a day's holiday, they were divided into three parties, and the outings arranged for separate days. The third party, consisting of about 800 workmen and friends, last Tuesday visited Bolton Abbey. For this, as on the two preceding excursions, ample preparations were made by the Engineer (Mr. William King), who left nothing undone which would add to the general enjoyment. Two commodious tents were erected near the Bolton Bridge, in one of which the parties were served with luncheon and tea; while entertainments were given in the other. A pleasant day was spent in this charming locality; and at the close, the excursionists expressed their appreciation of the kindness of the Directors and the leading officials of the Company.

European Gas Company, Limited.—The annual meeting of this Company was held yesterday. The report presented by the Directors stated that the additional quantity of gas actually sold had been at the rate of 1½ per cent.; but it was remarkable that the greatest increase had been obtained at the station where electric lighting had been most largely introduced. During the twelve months the Company fixed 2734 gas-stoves; bringing up the total number to 41,833. The net profit on the working in the year would, the report said, admit of a dividend of £1 6s. per paid-up share, and in the same proportion, according to the amount paid, on the other two series, less the interim dividend at the rate of 10s. per fully-paid share received on Feb. 1 last. After providing for this, a balance of £1493 would remain to be added to the reserve of undivided profits. Reference was also made to the project for distributing among the shareholders a portion of the amount now standing to the credit of the depreciation and redemption account. On the motion of the Chairman (Mr. H. M'Lauchlan Backler), seconded by Mr. H. Solomon, the report was adopted, and the dividend recommended declared. An extraordinary general meeting was afterwards held, at which the Directors were authorized to distribute among the shareholders, by way of bonus dividend, the sum of £250,545 cash standing to the credit of the depreciation and redemption account, and representing accumulated undivided profits; the same to be payable on Sept. 6 next to the shareholders registered or holding shares on the 11th prox., in proportion to the amount credited as paid on the shares held by them—this bonus dividend, however, being, at the option of any shareholder, applicable to the payment of the amounts then due in respect of any new shares or calls. It was also agreed to increase the capital to £840,150 by the issue of 13,203 registered new shares of £10 each. A notice of motion given by Mr. R. Hesketh Jones, to the effect that the long and valued services rendered by Mr. Backler should be recognized, and that a small Committee should be appointed to consider and recommend to the shareholders at the next meeting the most suitable and acceptable testimonial, was carried by acclamation. A full report of the meeting will be given in the next number of the JOURNAL.

GWYNNE & BEALE'S PATENT GAS EXHAUSTERS AND ENGINES.

Telegrams: "GWYNNEGRAM LONDON." TELEPHONE No. 2698.

GWYNNE & CO.,

HYDRAULIC AND GAS ENGINEERS,

ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON, W.C.

Thirty-three Medals at all the Great International Exhibitions have been awarded to GWYNNE & Co. for Gas Exhausters, &c.

They have completed Exhausters to the extent of 29,000,000 cubic feet passed per hour, which are giving unqualified satisfaction in work.

Makers of GAS-VALVES, HYDRAULIC REGULATORS, VACUUM GOVERNORS, STEAM-PUMPS for Tar, Liquor, or Water; CENTRIFUGAL PUMPS and PUMPING ENGINES, specially adapted for Water-Works, raising Sewage, &c.

Also GIRARD and other TURBINES, HIGH-SPEED ENGINES, DYNAMOS, &c., &c., for ELECTRIC LIGHTING.

Their Exhausters can be made, when desired, on their New Patent Principle, to pass Gas without the slightest oscillation or variation in pressure.

Catalogues and Testimonials on application.

Exhausting Machinery at Fulham and Bromley Gas-Works—each set passing 400,000 cub. ft. per hour, drawing 14 miles distant from Beckton.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAYS.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale in the United Kingdom than all other Oxides combined. Purity and uniformity of quality guaranteed. Pamphlet, "How to Purchase Bog Ore," to be obtained on application.
Gas Purification and Chemical Company, Limited, Palmerston Buildings, Old Broad Street, London, E.C.
JOHN WM. O'NEILL, Managing Director.

CANNEL COAL, ETC.

JOHN ROMANS & SON, EDINBURGH. Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS AND WATER WORKS.
Prices, &c., will be forwarded on application to No. 80, ST. ANDREW SQUARE, EDINBURGH, / NEWTON GRANGE, NEAR DALKEITH, } SCOTLAND.

HUTCHINSON BROTHERS, Barnsley, Gas Engineers and Contractors, Makers of Wet and Dry Gas-Meters and General Gas Apparatus, Sulphate of Ammonia Plant, Lead Saturators, Tanks, &c. Tools and Sundries.

BENTLEY & CO.

MANCHESTER ELECTRICAL STORES.

FOR Batteries, Bells, Wires and Special Electrical Apparatus, address the best house
17, NEWTON STREET, PICCADILLY, MANCHESTER.

JAMES LAWRIE & CO. supply Best SCOTCH CANNEL COALS, Best FIRE-CLAY RETORTS, BRICKS, TILES, and LUMPS; BOILER SEATING BLOCKS, FLUE COVERS, and SILICA BRICKS for SPECIAL FURNACE WORK; COKE BARROWS, BOGIES, and SMALL WAGONS.
Postal Address: 1, WHITTINGTON AVENUE, E.C.
Telegram Address: "EIRWAL LONDON."

W. C. HOLMES & Co., Huddersfield, AND 80, CANNON STREET, LONDON, Contractors for Gas-Works complete, Makers of Gas-holders, Purifiers, Scrubbers, Condensers, Retort Fittings, &c., Improved Valves, Engines, and Exhausters. Also for Collingwood's Regenerative Retort-Settings.
*** See Advertisement p. 64 of last week's issue.
Cablegrams: "Ignitor London." Telegrams: "Holmes Huddersfield."

J. & J. BRADDOCK, Globe Meter Works, Oldham.
First-Class Award, Melbourne Exhibition, 1889, for Wet and Dry Gas-Meters, Station Meters, and Governors, Pressure-Gauges, Street Lamps, and Pillars, &c.
Telegraphic Address: "Braddock, Oldham."

EXTRACT from the Harrogate Gas Company's Report, dated the 5th of February, 1890: Coal consumed, 3600 tons. Gas made, 92,880,000 feet; ditto sold, 84,880,000 feet; ditto unaccounted for, 8,000,000 feet; quantity made per ton, 10,800 feet; ditto sold, 9869 feet. Illuminating Power, 16·1 candles. Coals used, Brancepeth. Owners, Strakers and Love, Newcastle-on-Tyne; who have also Brandon Hutton Seam Unscreened Gas Coal. Analysis, 10,500 cubic feet per; Illuminating Power, 16·2 candles.

IRISH BOG ORE OXIDE OF IRON.

GAS PURIFICATION.

BALE, BAKER, & CO., direct Importers from Ireland. Sample and Price on application. Spent Oxide and Sulphate of Ammonia purchased.
120 and 121, NEWGATE STREET, LONDON, E.C.

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Chemical Works, LEEDS, specially produce this ACID from BRIMSTONE, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

COZE'S Automatic Apparatus for CHARGING AND DISCHARGING GAS-RETORTS. For Illustrated Advertisement of this System, see p. 172.
Inquiries should be addressed to THE COZE SYNDICATE, LIMITED, 86-88A, LEADENHALL STREET, E.C.

TAR and Liquor wanted. BROTHERTON AND CO., Commercial Buildings, LEEDS.

DRAUGHTSMAN and Designer, Age 30, wants SITUATION. Experienced with first-class Gas Firms. Gas, Sanitary, and Ornamental Metal Work, &c.
Address No. 1899, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS-FITTER (thoroughly practical) requires a SITUATION in Town or Country. Having a small income, partial employment would be accepted. Good references.
Address C. D., care of Housekeeper, 42A, Noble Street, Gresham Street, LONDON, E.C.

REQUIRED, a Situation as Assistant-ENGINEER in Gas-Works, or as CONTRACTOR'S AGENT, in England or Abroad. Comprehensive practical experience in the Design, Construction, Cost, and Working of Plant. Good Draughtsman and Estimator.
Address No. 1840, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Situation as Collector and BOOK-KEEPER, METER INSPECTOR, or ASSISTANT MANAGER, by a young Man age 27. Nine years' excellent character. Can assist in any duties at Gas-Works.
Apply to H. WARD, 214, Longford Street, WARRINGTON.

WANTED, by a single young Man, a Situation as FITTER. Well up in all Fittings, Compo. or Iron Pipe, Service Laying, Fixing Cooking and Heating Stoves, Meter Inspection, Dry and Wet Meters. Can give very good reference.
Address WILLIAM COWEN, People's Hotel, HARROGATE.

WANTED, by an experienced Man, a Situation as MANAGER or FOREMAN. Has had first-class experience in carbonising, and understands the general work of a gas-works. Exceedingly good testimonials. Antecedents will bear the strictest investigation.
Apply, by letter, to No. 1838, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO TAR DISTILLERS AND GAS COMPANIES.

WANTED, by the Advertiser, a Situa- tion to manage the Distillation of Coal Tar and Rosin. Thoroughly competent in converting all products into merchantable use—viz., Benzole, Anthracene, Packet Pitch, Varnishes, Sweetened Rosin, Oil, Anti-friction Greases, &c. Competent to erect plant for same. No objection to going abroad.
Address J. W. G., Swiss Cottage, 21, Jardin Street, Albany Road, WALWORTH, S.E.

WANTED, a Gas-Fitter well up in all classes of FITTING (Compo. or Iron Pipe, Service laying, and fixing Cooking and Heating Stoves) and Smithing.
Apply, stating wages required, to the MANAGER, Gas-Works, FAREHAM.

CIRENCESTER GAS-WORKS.

WANTED, immediately, a competent person to take charge of these Works, for Three months certain, during the Illness of the present Manager.
Write, stating terms required, &c., to the SECRETARY (J. Beecham), 12, Silver Street, CIRENCESTER.

WANTED, Two Second-hand Purifiers in good condition, with Bearing Bars, Sieves, Covers, and Lifting Gear complete. About 8 ft. by 5 ft.
Address W. L. COPP, Watchet, SOMERSET.

FOR SALE—One 8-horse power Engine and COAL BREAKER, with top and bottom Elevator, Gear, and Patent Wrought-Iron Chain, with Malleable Iron Buckets complete.
The above Machinery is almost new, having only been in use about Three months.
For further particulars, apply to the COAL DISTILLATION COMPANY—COOPER'S PATENTS—LIMITED, 323 and 325, Winchester House, Old Broad Street, LONDON E.C.

FOR SALE—One Single Gasholder, 80 feet diameter by 20 feet deep, ten Cast-Iron Columns and Wrought-Iron Girders.
Also four PURIFIERS in a group, 16 ft. by 12 ft. by 8 ft. 9 in. deep; 12-inch Centre-Valve and Connections.
Would erect the above, and make practically equal to new.
Inquiries invited for various second-hand Gas Plant—Gasholders, Tanks, Purifiers, Washers, Exhausters, Station Meters, &c.
Apply to SAML. WHILE (late Ashmore and While), 60, Queen Victoria Street, LONDON, E.C.

JOINTLESS GAS PRESSURE GAUGES. THOMAS'S PATENT.

NOW LARGELY IN USE IN ENGLISH WORKS.

THE Valuable Patent Rights in France, GERMANY, and the UNITED STATES of the above, will be SOLD BY AUCTION, by Mr. CHAS. HY. KNIGHT, at the Mart, Tokenhouse Yard, London, on Thursday, the 24th of July, at One o'clock.
Particulars and Conditions may be obtained of Messrs. E. CARLETON, HOLMES, and SON, Solicitors, 12, Bedford Row, LONDON, W.C.; of H. GARDINER, Esq., Patent Agent, 166, Fleet Street, LONDON, E.C.; of Messrs. RICHARD HOLMES, SON, LEAR, and BELDAM, the Vendor's Solicitors, LITTLEHAMPTON and ARUNDEL; or of the AUCTIONEER, Littlehampton, SUSSEX.

STOURBRIDGE GAS COMPANY.

DEBENTURE BONDS.

THE above Company are prepared to accept a LOAN of £2500 upon Debenture, at 3½ per cent. per annum for a period of five years, either in One or several sums.
Offers to be sent in to me on or before the 15th inst.
By order,
H. D. HOLLOWAY, Secretary.
Gas Offices, Amblecote, Stourbridge,
July 1, 1890.

THE Hornsey Gas Company have for SALE Two Cast-Iron TOWER SCRUBBERS—one 7 ft. 6 in. diameter by 30 feet high, and the other 10 feet diameter by 40 feet high—in good condition.
Full particulars can be obtained at the GAS-WORKS, Clarendon Road, HORNSEY, N.

BY ORDER OF THE DIRECTORS.

ENFIELD GAS COMPANY.
1200 £10 SHARES.

MR. Alfred Richards is favoured with instructions to SELL BY AUCTION at the Mart, Tokenhouse Yard, E.C., on Wednesday, July 30, 1890, at Twelve for One o'clock precisely, in lots of ten shares each, 1200 £10 SHARES in the Enfield Gas Company, ranking for a maximum Dividend of 7 per cent. (the last Dividend paid on the same class of Shares was at the rate of 6 per cent.); and they offer investments of a sound and improving character.
Particulars may be obtained of MR. PURDEY, Secretary to the Company, ENFIELD TOWN; of Messrs. F. J. and G. J. BRAIKENRIDGE, Solicitors, 16, BARTLETT'S BUILDINGS, E.C.; and of the AUCTIONEER, TOTTENHAM, and 8, NEW BROAD STREET, E.C.

SMALL GASHOLDER FOR SALE.

THE Eton Gas Company have For Sale at their Works at Eton, Bucks, a Second-hand Telescopic GASHOLDER, 50 feet diameter, in two-lifts, 11 feet each deep; six Cast-Iron COLUMNS, 25 feet long; and six Cast-Iron GIRDERS, 17 feet long (no Tank). The whole to be removed within One month after the tender has been accepted, without causing any obstruction to the Works.
Any further particulars required may be obtained of the Manager at the Works, which are 1 mile from the Windsor Station of the G. W. R., and ¾ mile from the S. W. R. Station, also ¾ mile from the River Thames.
Tenders to be sent in addressed to the Chairman, at 134, High Street, Eton, Bucks, on or before Monday, the 28th day of July next, marked "Tender for Gasholder."
The Directors do not bind themselves to accept the highest or any tender.
J. NEEDHAM, Secretary.
High Street, Eton, June 30, 1890.

FAREHAM GAS AND COKE COMPANY.

THE Directors invite tenders for the supply of 1500 tons (more or less) of best fresh wrought GAS COAL, delivered and metered free into carts at their wharf at the Works in such quantities as they shall from time to time require during the year ending the 30th of June, 1891.
Tenders, specifying the description of the Coal and the pits from which they are to be supplied, to be sent in to me by the 26th inst.
The lowest or any tender not necessarily accepted.
HARRY SMITH, Secretary.
Gas-Works, Fareham, Hants,
July 15, 1890.

TENDERS FOR GAS COAL.

THE Directors of the Burgess Hill and St. John's Common Gas Company, Limited, invite TENDERS for the supply of 500 tons (colliery weight) of screened THORNCLIFFE, SILKSTONE, PELAW MAIN, WALLSEND, EAST PONTOP, or other GAS COAL of equal quality, to be delivered during the first week of September next.
Tenders to be sent to the undersigned on or before Aug. 3, 1890.
The Directors do not bind themselves to accept the lowest or any tender.
S. H. NORMAN, Secretary *pro tem.*
Burgess Hill, Sussex,
July 12, 1890.

CORPORATION OF WARRINGTON.

TENDERS FOR COAL.

THE Gas Committee are prepared to receive TENDERS for the supply of 15,000 tons of COAL, COBBLES, or NUTS, to be delivered at their Works.
Particulars may be obtained on application to Mr. W. S. Haddock, Engineer, Gas-Works, Warrington.
Tenders, endorsed "Tender for Coal," to be sent in not later than the 30th inst.; the same to be addressed to the Chairman, Gas Committee, Warrington.
The Committee do not bind themselves to accept the lowest or any tender.
FREDK. TAYLOR, Secretary.
Gas Offices, Warrington,
July 9, 1890.

LINCOLN CORPORATION.
(GAS DEPARTMENT.)

THE Gas Committee of the Lincoln Corporation invite TENDERS for the supply of 14,000 tons of screened GAS COAL and NUTS, to be delivered during a period commencing the 1st of August, 1890, and terminating the 30th of June, 1891.
Further particulars and forms of tender may be obtained from the undersigned.
Sealed and endorsed tenders, addressed to the Chairman of the Gas Committee, must be delivered on or before the 28th inst.
The Committee do not bind themselves to accept the lowest or any tender.
JOHN CARTER, Manager.
Gas Offices, Lincoln,
July 9, 1890.

WREXHAM GASLIGHT COMPANY.

TO TAR DISTILLERS, ETC.

THE Directors of the above Company invite TENDERS for the Surplus TAR and AMMONIACAL LIQUOR produced at their Works for One year, commencing on the 1st day of August next.
Quantity produced, about 350 tons and 550 tons per annum respectively.
Further information may be obtained upon application to the undersigned, to whom tenders must be sent not later than the 25th inst.
The Directors do not bind themselves to accept the highest or any tender.
By order of the Board,
THOS. WALKER,
Secretary and Manager.
Wrexham, July 4, 1890.

HOLMSIDE GAS COALS.

THE Owners of Holmside and South Moor Collieries possess an undivided area of nearly 5000 acres of COAL in the County of Durham, over the greater portion of which area the most of the best Coal of the district, including the well-known Hutton Seam, remains almost untouched; and as preparations are being made for working the Hutton Seam on a large scale, it is expected that the reputation of HOLMSIDE GAS COALS will be still further increased. The Holmside and South Moor Collieries have been in the hands of the same families for over half a century; but, until lately, no adequate attempt has been made to open out their very large Coal-Field, notwithstanding that the best Coal of the district around them, and especially the Hutton Seam, has been for some time past seriously diminished by reason of the vigorous workings of neighbouring coal-owners. Holmside Gas Coals are now being worked out of Holmside and South Moor Collieries at a rate of about 2200 tons per working day—a rate totally inadequate to meet the existing demand. By an extensive development of workings in the Hutton Seam, it is hoped that the demand may be fully met, and the quality raised to the highest point attainable by Durham Coal.
For price and particulars, apply to MARK ARCHER, Holmside and South Moor Offices, Quayside, NEWCASTLE-ON-TYNE.

TENDERS FOR GAS COAL.

THE Directors of the Romford Gas and Coke Company, Limited, invite TENDERS for the supply of 2500 tons of best SOUTH YORKSHIRE SILKSTONE or other high-class Inland COAL during the Twelve months ending Aug. 31, 1891.
Tenders, endorsed "Tender for Coal," and stating price per ton delivered free at Romford Station G.E.R., as per Schedule to be supplied by the Company, to be sent in on or before July 25, 1890, addressed to the Chairman of the Company.
The Directors do not bind themselves to accept the lowest or any tender.
W. T. WILSHAW, Secretary.
South Street, Romford,
July 12, 1890.

MANSFIELD IMPROVEMENT COMMISSIONERS
(GAS DEPARTMENT.)

THE Mansfield Improvement Com- missioners invite TENDERS for the supply of about 190 tons of ordinary SOCKET PIPES for Gas Mains.
Particulars may be obtained by applying to Mr. Heydon, at the Gas-Works, Mansfield.
The Commissioners do not bind themselves to accept the lowest or any tender.
Tenders to be sent in on or before July 30, 1890, endorsed "Tender for Pipes," and addressed to
R. J. PARSONS,
Clerk to the Commissioners.
Mansfield, July 11, 1890.

OXIDE OF IRON.

THE Widnes Local Board are prepared to receive TENDERS for the supply of about 100 tons of OXIDE OF IRON, for Gas Purification.
Particulars may be obtained from MR. CARR, Gas Works, Widnes.
Tenders to be addressed to the Chairman, Gas Committee (endorsed "Oxide"), and delivered to the undersigned not later than the 31st inst.
The Board do not bind themselves to accept the lowest or any tender.
JAS. T. ALLEN, Clerk.
Town Hall, Widnes, July 12 1890.

CIRENCESTER GAS COMPANY, LIMITED.

THE Directors are prepared to receive TENDERS for the supply of from 2000 to 3000 tons of best screened GAS COAL, delivered free to the Watermoor Station of the Midland and South-Western Junction Railway Company, prior to the 30th day of June, 1891, at such times and in such quantities as the Manager may direct.
Tenders, marked "Tender for Gas Coal," to be delivered at the Company's Offices, 12, Silver Street Cirencester, on or before the 31st day of July next.
No special form of tender.
JOHN P. BEECHAM, Secretary.
Cirencester, July 10, 1890.

THE Directors of the Kildwick Parish Gas Company invite TENDERS for a supply of the whole or part of 2500 tons of best screened GAS COAL, to be delivered free at Kildwick from the 1st of September, 1890, to the 31st of August, 1891, at such times and in such quantities as the Company may require.
Tenders to be sent in not later than the 4th of August next, addressed to the Chairman, and endorsed "Tender for Gas Coal." JOHN GARLICK,
Secretary and Manager.
Gas Office, Kildwick, *via* Keighley,
July 11, 1890.

BOROUGH OF MACCLESFIELD.

THE Gas Committee are prepared to re- ceive TENDERS for the supply of the whole, or part, of 6000 tons of the best screened GAS COALS and 1000 tons of CANNEL, delivered free at Macclesfield, to commence on the 1st day of September, 1890, extending One year, and in such quantities as may be ordered.
Tenders, sealed and endorsed, to be sent in not later than the 19th day of July, 1890, addressed to the Chairman, Gas Committee, Town Hall, Macclesfield.
The Committee do not pledge themselves to accept the lowest or any tender.
(Signed) W. FREDK. TAYLOR,
July 9, 1890. Town Clerk.

TAR.

THE Directors of the Cheltenham Gas-light and Coke Company invite TENDERS for the purchase of the surplus TAR made at their Works for One, Two, or Three years, commencing on the 1st day of October, 1890.

Particulars may be obtained from the undersigned, to whom tenders must be sent on or before the 17th day of July next.

The Directors do not bind themselves to accept the highest or any tender.

R. O. PATERSON, Engineer.

Gas-Works, Cheltenham,
June 21, 1890.

CARDIFF GASLIGHT AND COKE COMPANY.

TENDERS FOR COAL.

THE Directors of the above Company are prepared to receive TENDERS for a supply of 50,000 tons of best, well screened, large GAS COALS, to be delivered between July, 1890, and June 30, 1891, in monthly quantities in accordance with the Specification.

Parties tendering may do so for the whole quantity, or for quantities from 5000 tons upwards.

Forms of tender and specification of monthly deliveries may be obtained on application to Mr. H. Morley, the Company's Engineer.

Sealed tenders to be sent to the undersigned not later than Thursday, the 17th day of July next, addressed to the Chairman of the Company, and endorsed "Tender for Coal."

The Directors do not bind themselves to accept the lowest or any tender, and reserve to themselves the right to apportion the whole quantity as they may think fit.

By order,
GEORGE CLARRY, Secretary

Gas Office, Cardiff, June 20, 1890.

TENDERS FOR COAL.

COMMERCIAL GAS COMPANY.

THE Directors are prepared to receive TENDERS for the supply of 170,000 tons of clean, dry, unscreened, fresh wrought GAS COALS, delivered f.o.b. to the Company's steamers, at any suitable port, during the year ending the 31st of July, 1891.

The deliveries to be in equal monthly quantities throughout the year.

Payment in cash fortnightly.

Parties desiring to tender for more than One year must state separately the price and quantity offered for each year.

Particulars and forms of contract may be obtained from the Engineer, Mr. H. E. Jones.

The Directors do not bind themselves to accept the lowest or any tender.

Tenders, sealed, and endorsed "Tender for Coals," to be addressed to the Chairman of the Coal Committee, and delivered at the Company's Offices not later than the 24th of July inst.

Commercial Gas-Works, Stepney, E.,
July 14, 1890.

COMMERCIAL GAS COMPANY.

THE Directors of the Commercial Gas Company are prepared to receive TENDERS for the surplus BREEZE produced at their several Works for the Twelve months ending the 31st of July, 1891.

The quantities are estimated to be as under, but the same cannot be guaranteed, and may be more or less—

At the Stepney Works, in the Regent's Canal, 5000 chaldrons of 48 bushels.

At the Wapping Works, in the Thames, 5000 chaldrons.

At the Poplar Works, in Bow Creek (free waterway), 5500 chaldrons.

The tenders may be for the whole or for one or more Works separately.

The Contractors must give security to remove the Breeze as it accumulates, to pay for the same monthly, and generally for the due fulfilment of the contract.

The form of agreement to be signed can be seen at the Company's Offices.

Tenders, sealed, and endorsed "Tender for Breeze," to be delivered here not later than the 24th of July inst.

The Directors reserve to themselves the right to accept any tender in part or in whole, and do not bind themselves to accept the highest or any tender.

Commercial Gas-Works, Stepney, E.,
July 14, 1890.

ASHFORD, KENT.

TENDERS FOR COAL.

THE Directors of the Ashford Gas and Coke Company, Limited, are prepared to receive TENDERS for the supply of about 3000 tons of Screened or Unscreened GAS COALS, to be delivered on the Siding at their Works, at Ashford, in equal monthly quantities, from the 1st of September next to the 31st of March, 1891.

Tenders, specifying the description of the Coals, the Pits at which they are raised, and the terms for net monthly payment, to be sent to me on or before the 25th day of July inst., endorsed "Tender for Coals."

F. HUGHES-HALLETT,
Secretary.

Ashford, July 2, 1890.

TIPTON GAS-WORKS.

BRICK GASHOLDER TANK.

THE Gas Committee of the Tipton Local Board are prepared to receive TENDERS, for the construction of a BRICK GASHOLDER TANK 102 feet diameter and 25 feet deep.

Drawings and specification may be seen and other particulars obtained at the Gas-Works, on application to Mr. Vincent Hughes, the Engineer.

Sealed and endorsed tenders to be sent to me, the undersigned, on or before Tuesday, the 22nd day of July, 1890.

The Committee do not bind themselves to accept the lowest or any tender.

By order,
G. M. WARING, Clerk to the Board.

Tipton, July 5, 1890.

BOROUGH OF ILKESTON.

THE Gas Committee are prepared to receive TENDERS for the supply and delivery at their Gas-Works of 5000 tons of GAS COAL.

Conditions and form of tender may be had of the Manager (Mr. F. C. Humphrys), at the Gas-Works, Rutland Street, Ilkeston.

Sealed, endorsed tenders must be delivered to the undersigned by Four o'clock in the Afternoon of Thursday, the 24th day of July next.

The Committee do not bind themselves to accept the lowest or any tender; and they reserve to themselves the right to divide the quantity above named into two or more contracts.

By order.
WRIGHT LISSETT,
Town Clerk.

Town Hall, Ilkeston, June 30, 1890.

TENDERS FOR TAR AND LIQUOR.

THE Directors of the Slough Gas and Coke Company are prepared to receive TENDERS for the purchase of the surplus TAR and AMMONIACAL LIQUOR (or either) produced at their Works, for a term of One year, from the 30th of June, 1890.

The Slough Branch of the Grand Junction Canal is available.

The estimated quantities to be produced are: Tar, 20,000 gallons; and Liquor, 45,000 gallons.

Further particulars may be obtained on application to the undersigned.

Sealed tenders, stating price for tar per barrel of 36 gallons, and prices for ammoniacal liquor per 1000 gallons of different strengths, at the Company's Works, and endorsed "Tender for Tar and Liquor," to be delivered on or before Tuesday, the 22nd of July next.

The Directors do not bind themselves to accept the highest or any tender.

ARTHUR THOMAS, Secretary.

High Street, Slough, June 25, 1890.

Price 2s. per dozen, or 10s 6d. per 100, post free.

CONSPIRACY and Protection of Pro-perty Act. It is required, under a Penalty of FIVE POUNDS, that a Printed Copy of the 4th Section of this Act shall be posted up at all Gas-Works, in a conspicuous place, where the same may be conveniently read by the persons employed thereat.

Printed copies of this Section, in large type, on broad sheets, may be obtained of WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

*** *The Act extends to Scotland and Ireland.*

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NOTE ALTERATION OF ADDRESS.

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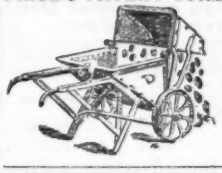

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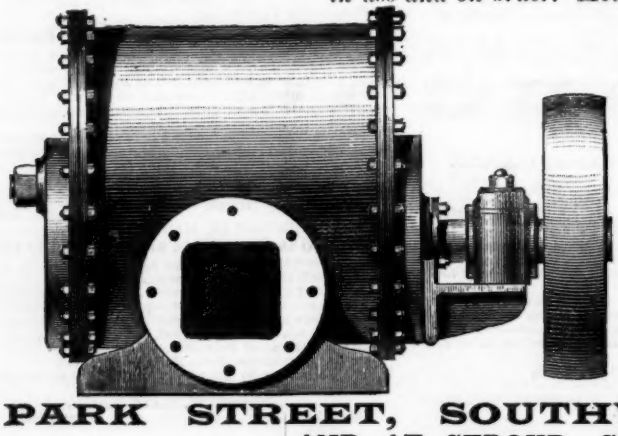
With or without Engine combined. To pass up to 300,000 cubic feet per hour. Nearly 200 in use and on order. Model sent for inspection.



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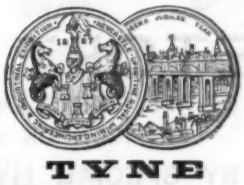

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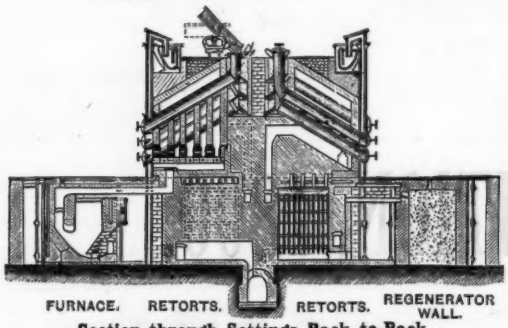
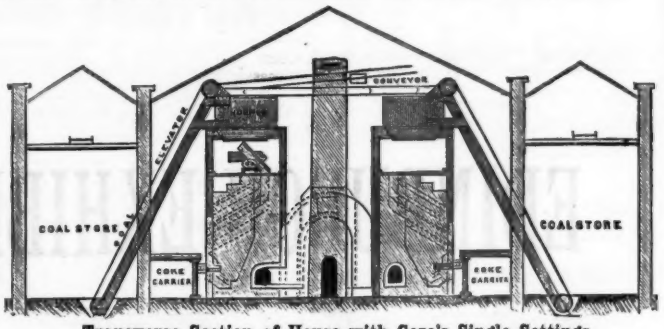
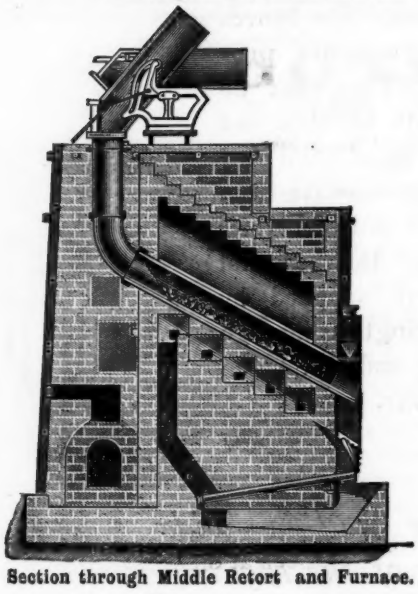


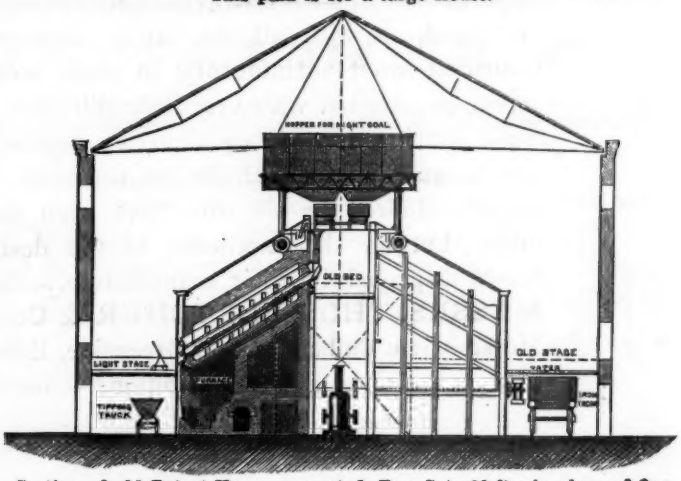
Section through Settings Back to Back.
Working off ground floor with Generator under Stage and Regenerator under the Sets.



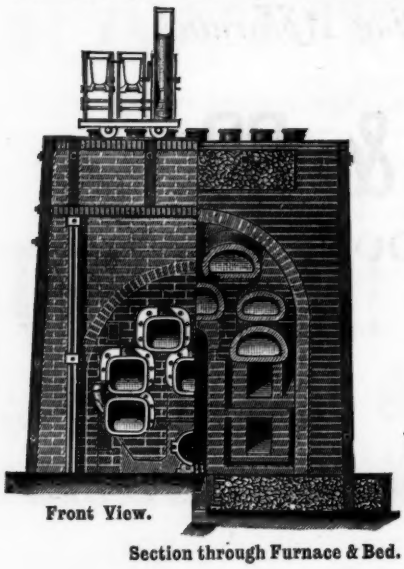
Transverse Section of House with Coze's Single Settings,
Showing Method of working Two Single Settings and Distributing the Coal to the Supply Hoppers; the whole of the work being Automatic.
This plan is for a large House.



Section through Middle Retort and Furnace.

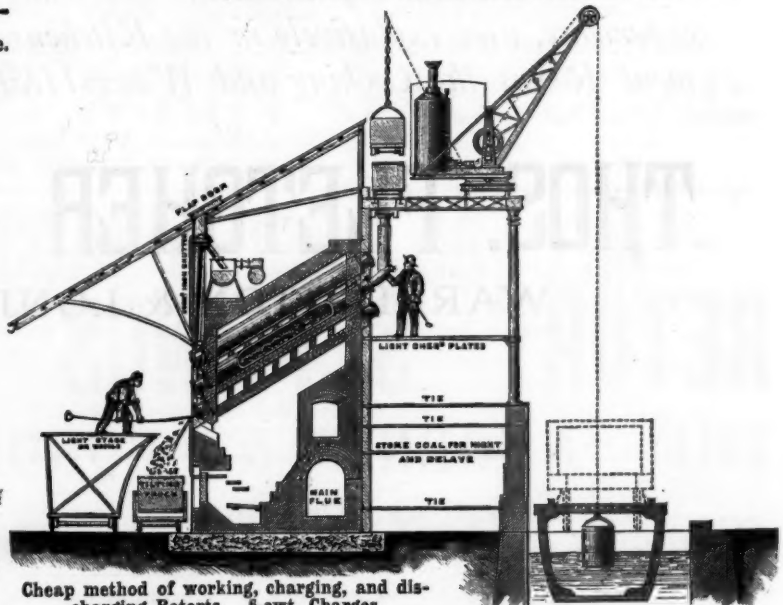


Section of old Retort-House converted, Two Sets 20 fts. in place of One.
Modified form, with ordinary Retorts and Fittings.



Front View.

Section through Furnace & Bed.



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A SPECIAL COMPOUND

FOR THE CURE OF STOPPED ASCENSION-PIPES,

A couple of charges of which will clear a stopped pipe, and an occasional charge keeps them clean, and also increases the make per ton and the illuminating power.

PRICE AND PARTICULARS ON APPLICATION.

Head Office: CORPORATION STREET, BIRMINGHAM.

SIXTY PER CENT. ECONOMY IN GAS LIGHTING.

The Schülke Regenerative Lamp

FOR

DOMESTIC AND EXTERNAL LIGHTING.

The only Regenerative Lamp employing the Common Flat-Flame Burners.

Lamps giving 20-Candle power consume less than four feet of Gas per hour.

PURE WHITE & PERFECTLY STEADY LIGHT,

NOT AFFECTED BY DRAUGHTS.

Suitable for any existing fittings (Brackets or Suspending).

Can be fixed in a few minutes.

May be seen at the Offices of the

SCHÜLKE GAS-LAMP Co.

LIMITED,

Room 446—11, QUEEN VICTORIA STREET,

LONDON, E.C.,

Where Price Lists and full particulars may be obtained.

RETORT SETTINGS IMPROVED

BY ADOPTING

THE "NUGENT" & "ROBUS" SETTINGS.

ECONOMY WITH DURABILITY GUARANTEED.

HUNDREDS OF SETTINGS WORKING EMINENTLY SATISFACTORY.

Estimates and Particulars for every Description of Retort Extensions and other Work.

J. & H. ROBUS,

CONTRACTORS FOR GAS AND WATER WORKS,

20, BUCKLERSBURY, LONDON, E.C.

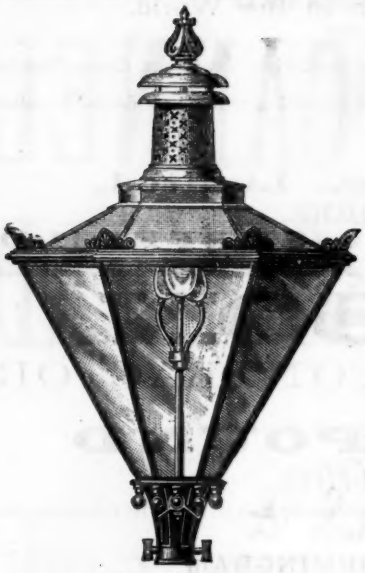
D. HULETT & CO., LIMITED,

GAS ENGINEERS,

55 and 56, High Holborn, London,

MANUFACTURERS OF EVERY DESCRIPTION OF GAS-FITTINGS,

GAS-METERS, GAS-LAMPS, GOVERNORS, ETC.



HIGH-POWER LAMPS

OF THE MOST IMPROVED CONSTRUCTION.

STRONG COPPER TOPS.

PATENT GOVERNOR BURNERS,

Giving from 16 to 450 Candle Power.

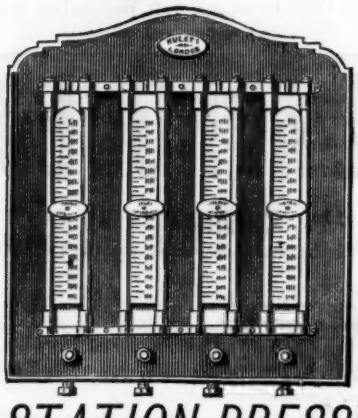
D. HULETT & Co., Limited,

Invite Gas Companies and Local Authorities to compare the Quality of these Lamps with other Makers'.

PATENT STREET LAMPS.

NO PUTTY REQUIRED.

Several thousands of these have been made, and are giving every satisfaction. New Glass can be inserted in a few minutes by any inexperienced person.

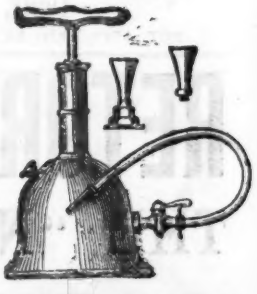


HULETT'S

Patent Service Cleanser,

FOR REMOVING OBSTRUCTIONS IN SERVICE-PIPES AND MAINS.

No Gas Company should be without this Valuable Invention.



PATENT STREET LAMP GOVERNORS.

STATION PRESSURE GAUGES, on Enamelled Iron Plates.

WROUGHT AND CAST IRON TUBES AND FITTINGS.

JAMES D. PERKINS. F. SEAVERNS.

PERKINS & Co.,

228 & 229, PRODUCE EXCHANGE, NEW YORK.

Cable Address: "PERKINS, NEW YORK." *Post Office Box 3695, New York.*

SOLE AGENTS FOR THE CELEBRATED

BRECKENRIDGE CANNEL

AND THE

OLD KENTUCKY BOGHEAD

OF KENTUCKY, U.S.A.

These Cannels will rank with the Australian Shale for Gas Manufacture.

Also General Sales Agents for

PENNSYLVANIA & VIRGINIA GAS COALS, & AMERICAN FOUNDRY & FURNACE COKE.

Delivery Prices made to any Port in

GREAT BRITAIN, ON THE CONTINENT, OR SOUTH AMERICA.

Full Information furnished upon Application to the above Address.

FACE YOUR RETORT MOUTHPIECES.

JOHN RUSCOE calls attention to his Retort Mouthpiece and Lid Facing Machines, which are in extensive use; also to his Lathes, Drilling, Slotting, Grooving, and Planing Machines, Smiths' Hearths, Smithy Fans, Roots' Blowers; also special Screwing Machines for Gas Tubes and Bolts, Taps, Wrenches, Pipe Cutters, special Taper and Twisted Rymers, Drills, &c.

PATENT TWISTED TAPS, DIES, & CUTTERS.

Thousands in constant work, give universal satisfaction.

Work Easier, Less Friction, Last Longer, and do Better Work than straight Grooves.

Main Drilling Stand, with Cup Drills, 1¼ to 6 inch; Taps, Rymers, and Drills.

Ratchet Screwing Stocks, and Adjustable Once-up Stocks, Dies, Guides &c.

Inquiries and Trial Orders Solicited. Everything Guaranteed. Apply to

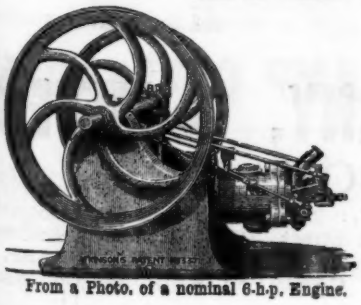
JOHN RUSCOE, Albion Works, Hyde, near Manchester.

MANLOVE, ALLIOTT, & Co., Ltd.,

ENGINEERS,

NOTTINGHAM,

LONDON, MANCHESTER, AND GLASGOW.



From a Photo. of a nominal 6-h.p. Engine.

ATKINSON'S "CYCLE" PATENT

GAS-ENGINE.

The simplest and most economical Gas-Engine made.

THE BEST ENGINE FOR ELECTRIC LIGHT.

Consumes less Gas per brake horse power than any other Gas-Engine.

Telegraphic Address: "MANLOVES NOTTINGHAM."

BELL'S ASBESTOS AQUOL PAINT

IS MADE READY FOR USE.

IS FIRE RESISTING.
IS WASHABLE.
IS NON-POISONOUS.
IS MANUFACTURED IN ALL USEFUL COLOURS.
IS IMPERVIOUS TO HEAT, COLD, OR WATER.
IS WITHOUT SMELL.

No expensive Oil or Turpentine required.

WILL NEVER BLISTER.

HAS A COVERING CAPACITY 40 PER CENT. GREATER THAN LEAD PAINTS.

For Outside or Inside Work in any Climate.

Bell's Asbestos Aquol Paint is equally suitable for the finest decorative work as well as for general painting. It can be applied over or under any other paint, and, owing to its easy application, can be used with a large distemper brush; the SAVING THUS EFFECTED IN LABOUR BEING **50** PER CENT. OVER THAT OF LEAD PAINTS.

Bell's Asbestos Aquol Paint is susceptible of the most delicate treatment; and, owing to its perfect flatted surface, it brings up the varnish in a manner that no other paint can equal. ONE COAT OF VARNISH ON **Bell's Asbestos Aquol** IS EQUAL TO TWO COATS ON ORDINARY PAINT.

BELL'S ASBESTOS AQUOL PAINT is specially adapted for Private Houses, Exhibition Buildings, Ships, Churches, Asylums, School Boards, Railway Stations, and all work of Wood, Iron, Cement, Plaster, Stone, Brick, &c., &c.

Those who Study Economy and Protection from Fire should use only

BELL'S ASBESTOS AQUOL PAINT.

BELL'S ASBESTOS AQUOL PRIMING is made Ready for Use.
BELL'S ASBESTOS AQUOL PRIMING stops all suction of Wood, Cement, Plaster, &c.
BELL'S ASBESTOS AQUOL PRIMING should be applied to all New Work.

Suitable for Ceilings, Walls, and New Wood, and is very durable.

BELL'S ASBESTOS AQUOL KNOTTING, for Stopping Knots in New Work.

AN EXCELLENT CURE FOR DAMP WALLS.

Colour Cards and Price Lists on Application.

Supplied in Casks of 5 to 7 cwt., and Iron Drums of 28, 56, and 112 lbs., Sample Tins of 7 and 14 lbs.

Owing to its Covering Capacity, a SAVING IN FREIGHT of 40 per cent. is effected for a given surface.

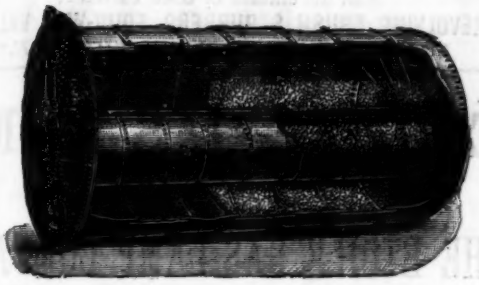
BELL'S ASBESTOS COMPANY, LIMITED,

SOUTHWARK, LONDON, S.E.

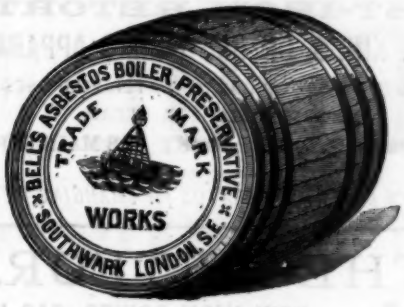
DEPOTS—MANCHESTER: Cable Street, Blackfriars. LIVERPOOL: 2, Strand Street, James Street. HULL: Humber Dock Basin. GLASGOW: 35, Robertson Street. DUBLIN: 2, St. Andrew Street. AMSTERDAM: 264, N. Z. Voorburgwal. BERLIN, BARCELONA, and ANTWERP.
AGENTS—BIRMINGHAM: BELL and Co., 7, John Bright Street. CARDIFF: BELL and Co., West Bute Street.

BELL'S ASBESTOS BOILER PRESERVATIVE

Will remove Incrustation from Steam-Boilers of all kinds without chipping.



A shows Boiler Plates when incrusted.
B shows Boiler Plates when cleaned by this Composition.



Every Cask is sent out as above.

The action of this **BOILER PRESERVATIVE,** by absorbing the free oxygen that is in the water, **entirely checks pitting and corrosion.** It also disintegrates incrustation so immediately as to prevent its adhering to the plates; and the deposit falls to the bottom in a loose powder, which is easily swept out. By keeping boilers clean, a **great economy of fuel is effected,** and the danger of the plates burning is entirely obviated; thus avoiding the great risks which are inseparable from scaled plates, lengthening the life of a boiler, and **covering its own cost a hundredfold.** Whenever possible it should be used through Feed Pump or Injector, which it will also keep clear from incrustation. The small quantity required to effect its purpose makes this the most economical, and more than repays the higher price we charge for a fluid which, in the case of many other makers, is useless.

QUANTITY REQUIRED—A quarter of a pint weekly per horse power indicated; where the water is very bad rather more, or one pint for every 700 gallons of water evaporated.

BELL'S ASBESTOS CO., Ld.

DEPÔTS.
MANCHESTER: Cable St., Blackfriars.
LIVERPOOL: 2, Strand St., James St.
HULL: Humber Dock Basin.
GLASGOW: 35, Robertson Street.
DUBLIN, BERLIN.

DEPÔTS.
AMSTERDAM: 264 N. Z. Voorburgwal,
BARCELONA, and ANTWERP.

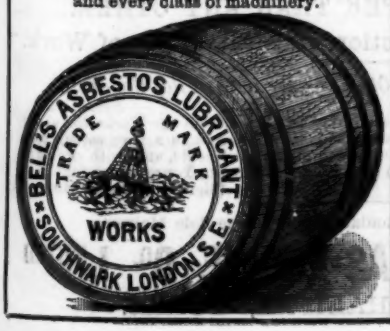
AGENTS.
BIRMINGHAM: BELL and Co., 7, John Bright Street.
CARDIFF: BELL and Co., West Bute St.

SOUTHWARK, BELL'S ASBESTOS. LONDON, S.E.

BELL'S ASBESTOS
YARN AND SOAPSTONE PACKING
Is the BEST LOCOMOTIVE PACKING made.

BELL'S
COMPOUND HYDRAULIC PACKING
Is specially suited for
Hydraulic Machinery, Accumulators and Ammonia and all Pumps.

BELL'S ASBESTOS LUBRICANT
Is unequalled
For Steam-Engines & Cylinders, Gas-Engines, and every class of machinery.

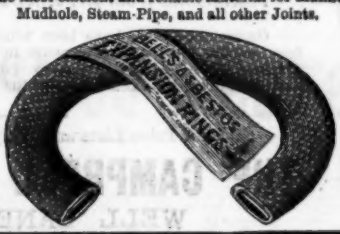


BELL'S ASBESTOLINE
The reputation of this Lubricant is based on the experience of thousands of users, which places it far in advance of those who rely only on mere laboratory tests.

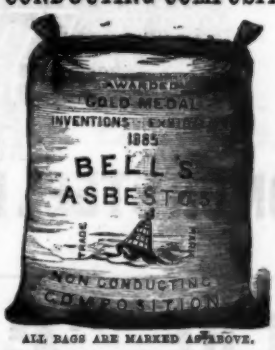
ASBESTOLINE IS THE CHEAPEST MOST EFFICIENT, CLEANEST MOST INODOROUS AND SAFEST LUBRICANT.

ASBESTOLINE HAS SAVED 90 PER CENT. OVER OIL. Has been used for all purposes, AND BEATEN ALL OTHER LUBRICANTS IN ACTUAL WORK.

BELL'S ASBESTOS
EXPANSION SHEETING
RINGS, AND TAPE.
Is the most efficient and reliable Material for Manhole, Mudhole, Steam-Pipe, and all other Joints.



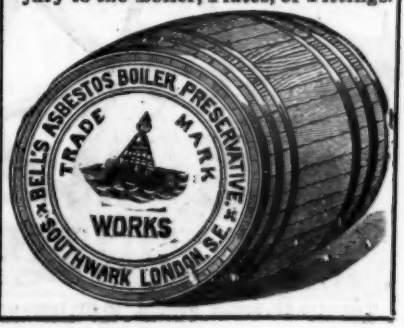
BELL'S ASBESTOS
NON-CONDUCTING COMPOSITION.
Will reduce loss by radiation and saves 40 per cent. of fuel.
Is superior to any other, and saves its cost in a few months.



Can be applied again after many years' service. Is sent out dry in bags; therefore cheaper than others sent out wet.

ALL BAGS ARE MARKED AS ABOVE.

BELL'S ASBESTOS
BOILER PRESERVATIVE
Will effectually keep Boilers clean, and remove any Incrustation, without injury to the Boiler, Plates, or Fittings.



THE THAMES BANK IRON CO.

UPPER GROUND STREET, LONDON, S.E.,

SUPPLY FROM STOCK

CAST-IRON RETORTS

AND ALL KINDS OF GAS-WORKS APPARATUS.

SOCKET-PIPES FOR GAS OR WATER PURPOSES.

FLANGE PIPES FOR STEAM.

Sole Manufacturers of **LYON'S 'PATENT' GAS MAIN SYPHONS,**

AGENTS FOR

ATTERTON'S PATENT APPARATUS for CHARGING RETORTS.

"THE METEOR."

NEW HIGH-POWER GAS-LAMP.

Westphal's Patent.

Gas Companies should hire these Lamps to their Consumers, and introduce them for Street Lighting as a rival to the Electric Light, as they do not get out of order, are most economical, and the Burner being a circular slit does not choke up.

Particulars and Prices Free.

HENRY GREENE & SONS,

SOLE CONSIGNEES FOR GREAT BRITAIN & COLONIES,

153 TO 155, CANNON STREET,

LONDON BRIDGE, E.C.

HENRY BALFOUR & CO.,

LEVEN, FIFE,

MAKERS OF

GASHOLDERS

And all classes of GAS PLANT,

REVOLVING BRUSH SCRUBBERS, FOUR-WAY VALVES.

LONDON: 13, BILLITER STREET, E.C.

THE

ÉTOILE GAS-LAMP

(REGENERATOR).

Sole Makers and Proprietors,

THE ÉTOILE GAS-LAMP COMPANY,

Gas Lighting and Ventilating Engineers,

PRINCESS STREET, MANCHESTER.

LISTS ON APPLICATION.

WILLIAM INGHAM & SONS,

WORTLEY FIRE-CLAY WORKS,

Near LEEDS

Have confidence in drawing the special attention of GAS ENGINEERS to the following advantages of their Retorts:—

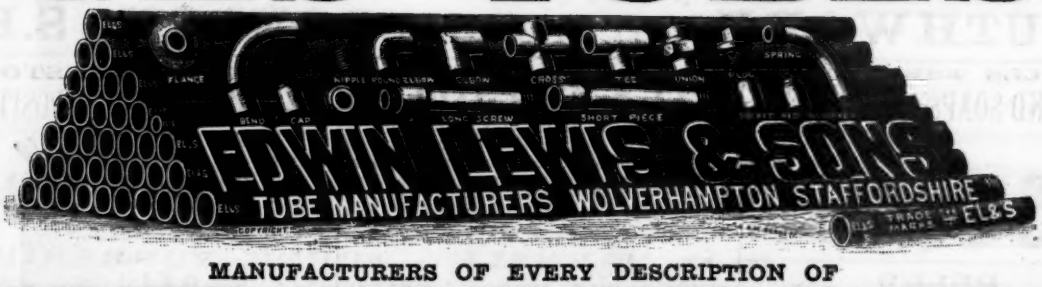
1. Smooth interior, preventing Adhesion of Carbon.
2. They can be made in one piece up to 10 feet long.
3. Uniformity in thickness, ensuring equal Expansion and Contraction.

PATENT

MACHINE-MADE GAS-RETORTS.

ESTABLISHED 1825.

GAS TUBES

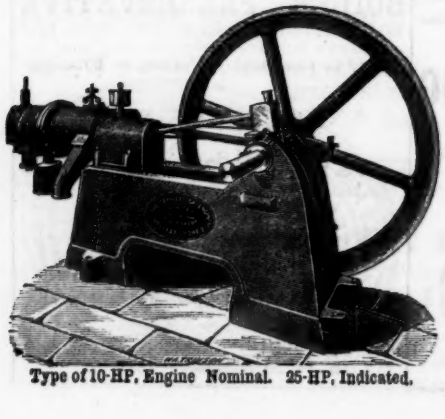


MANUFACTURERS OF EVERY DESCRIPTION OF

IRON OR STEEL LAP-WELDED OR BUTT-WELDED TUBES

FOR ANY PURPOSE.

THE "CAMPBELL" GAS-ENGINE.



Type of 10-HP. Engine Nominal. 25-HP. Indicated.

GREAT SUCCESS.

20 PER CENT. CHEAPER THAN ANY OTHER.

Gives the Highest Satisfaction with all kinds of Work.

Testimonial from Mr. JAMES MOON, Engineer to the Filey Gas-Works.

Feb. 9, 1889.

GENTLEMEN,—We have been using one of your Gas-Engines on our Works for about four months, and I have pleasure in saying that it does its work in a very satisfactory manner. The engine is half-horse power, steady in all its movements, and, with ordinary care, will drive the exhaust apparatus at an even gauge.—I remain, Yours respectfully.

(Signed) JAMES MOON.

For Price Lists and full particulars, apply to the Sole Makers:

THE CAMPBELL GAS-ENGINE CO. LIMITED

WELL LANE, HALIFAX, YORKS.

WASHER-SCRUBBER and WATER TUBE,

SLOW-SPEED CONDENSER

(Kelman's English & American Patents).

These Apparatus are in use at the Gas-Works at Lincoln, Mountain Ash, Neath, Ellesmere (Salop), Woodstock (Cape Town); and
Two large CONDENSERS, capable of dealing with **4,000,000** cubic feet of Gas per day have recently been erected at the Gas-Works at Sheffield. A large CONDENSER is also being erected at the ontreal Gas-Works.

PERFECT CONDENSATION. NO POWER REQUIRED.

For Prices and further Information, apply to

J. A. KELMAN, WINCHESTER HOUSE, LONDON, E.C.

S. PONTIFEX & CO.,

GAS and WATER ENGINEERS,

Manufacturers of and Contractors for the Maintenance of

PUBLIC LAMPS & LANTERNS;

GLASS—Flint Opal, and Bent in Stock, and Cut to Sizes.

WELL LAMPS, STREET NAME TABLETS,

LAMP COLUMNS, HEAD IRONS, PUTTYLESS LAMPS,

LANTERN COCKS, REGULATORS.

Improved High-Power Lanterns for Lighting Street Refuges and Open Spaces.

BROWN'S PATENT

LAMPLIGHTERS' TORCHES.

PROPRIETORS AND MANUFACTURERS OF

BOX'S PATENT

PUTTYLESS STREET LAMP.

This Lamp may be supplied fitted with clear opal, or ribbed glass, *as also with enamel tops* if required. The necessary fittings for altering existing Lamps to this system can be supplied at moderate prices.

S. PONTIFEX & CO., 22, COLEMAN ST., LONDON.

Works: 18, STEPHEN STREET, TOTTENHAM COURT ROAD, W.

PATENT GLASS LAMPS & COVERS

For Streets, Railway Platforms, &c., &c.

(Patented the 4th of May, 1889.)

This Lamp and Top, being made entirely of Glass, is perfectly impervious to corrosion, and therefore invaluable in Manufacturing and other Towns. The Top can be had in clear or coloured Glass and is much cheaper than the old style of metal frames. The New Lamp can be adapted to the old metal frame top.

Prices on application.

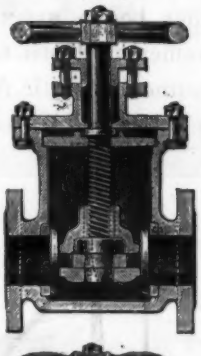
PILKINGTON BROS.,

Glass Works, St. Helens, Lancashire.

W. H-SPENCER & CO.,

HITCHIN, HERTS,

— *ENGINEERS.* —



PATENT CAM FULL-WAY

VALVES,

1 INCH to 8 INCHES,

Instantaneous Grip and Release, occupying less Space than any other Full-Way Valve; made with either Internal or External Spindle. Gun Metal or Phosphor Bronze Valves, Seats, and Spindles.

Prices on Application.

CAST-IRON SYPHON PUMPS.

2½ by 6 in. Stroke - - £1 10 0 each.
2½ by 9 in. „ - - £1 16 0 „

WROUGHT-IRON DITTO.

2½ by 6 in. Stroke - - £1 13 6 each.
2½ by 9 in. „ - - £1 19 6

NET.

GAS COAL.

BEST

REAL OLD SILKSTONE GAS COAL.

Address, THE STRAFFORD COLLIERIES COMPANY,

Near BARNSLEY, SOUTH YORKSHIRE.

WILLEY & CO.,

GAS ENGINEERING WORKS, COMMERCIAL ROAD, EXETER.

London Offices: 6 & 7, KING WILLIAM STREET, E.C.

MANUFACTURERS OF EVERY DESCRIPTION OF

GAS APPARATUS,

GASHOLDERS, Telescope and Single-Lift, any size. Some of the largest in the Kingdom erected by this Firm are giving the highest satisfaction.

PLANS and SPECIFICATIONS furnished for **Extensions** and **Enlargement** of existing Works, adapting them to the most **Improved** and **Modern Principle** of **Gas Manufacture.**

PURIFIERS, CONDENSERS, WASHERS, ENGINES and EXHAUSTERS, STATION METERS and GOVERNORS, manufactured and erected.

Makers, by permission of that eminent authority **Mr. GEORGE LIVESEY,** of his **CELEBRATED PATENT WASHER,** highly approved by all the Engineers of Works where adopted. Largely in demand.

Special reference and attention are invited to our

WET AND DRY METERS,

which have acquired a high reputation for the **excellence** of Materials and Workmanship; their **durability** and **accuracy** of **Register** guaranteed. They are used by several of the **London Gas Companies,** and over **200 Provincial Gas Companies.**

Price Lists, Specifications, and Estimates provided for any work appertaining to Gas Lighting, from the Retort-House to the Drawing-Room.

W. PARKINSON & CO.'S PRESSURE RAISERS

Have been supplied for many years, and are now in successful operation, for the purpose of

INCREASING THE PRESSURE IN LOW DISTRICTS, ETC.

The Machine acts as an Exhauster, drawing the Gas from the Main and propelling it according to the Pressure required. The result is obtained by a Wet-Meter Drum, which is revolved by Multiplying Wheels and Pullies, actuated by a Weight, as shown in the Engraving. The Pullies may be so arranged as to keep the Apparatus at Work for many hours, provided only there is sufficient depth for the Weight to fall. Pressure Raisers have been successfully employed in connection with Apparatus for the Manufacture of Oil Gas, &c. They are also used for supplying a current of Air for various purposes.

Made in Sizes from

5 to 200 LIGHTS.

SEE CATALOGUE.

TESTIMONIALS.

From Peter W. Barlow, Esq., F.R.S., F.G.S.
Engineer to the Tower Subway Co.

56, Landsdowne Road, W.,
Feb. 21, 1888.

DEAR SIRS,

The Gas-Pressure Engine in the Tower Subway acts most satisfactorily. It requires very little attention, and is very rarely out of order.

I am, yours truly,
PETER W. BARLOW.

Cork Gas Consumers' Company,
Gas-Works, Cork,
20th Feb., 1888.

GENTLEMEN,

In reply to yours, I beg to say that the Motive-Power Meters with which you have supplied this Company are doing very well. With them we are able to give a good supply to consumers in districts where it would be otherwise difficult to do so.

I am, faithfully yours,
THOMAS TRAVERS,
Engineer.

COTTAGE LANE WORKS, CITY ROAD,
LONDON.
Telegraphic Address: "INDEX."

BELL BARN ROAD WORKS,
BIRMINGHAM.
Telegraphic Address: "GAS-METERS."

OFFICE: 10, MAWSON'S CHAMBERS, DEANSGATE,
MANCHESTER.
Telegraphic Address: "PRECISION."

[See also Advt., p. 134.

London: Printed by WALTER KING (at the Office of King, Sell, and Railton, Ltd., 12, Gough Square); and published by him at No. 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, July 15, 1890.